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FIFTY-FIRST ANNUAL CONVENTION

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*State Dairymen's
Association*

Held at Carbondale, Illinois,
January, 20, 21 and 22,
1925

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LETTER OF TRANSMITTAL

Office of Secretary,
Illinois State Dairymen's Association,
Chicago, Ill., 1925.

cont. WINN
To His Excellency, Len Small, Governor of the State of
Illinois:

I have the honor to submit the official report of the
Illinois State Dairymen's Association, containing the ad-
dresses, papers and discussions at its fifty-first annual meet-
ing, held at Carbondale, Illinois, January 20, 21 and 22,
1925.

v. 51. 1925.
Respectfully,

dir. g.
GEO. CAVEN, Secretary.

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LIST OF OFFICERS

President—

W. S. O'HAIR, Paris, Ill.

Vice-President—

S. J. STANARD, Springfield, Ill.

Secretary—

GEORGE CAVEN, Chicago.

Treasurer—

CHARLES FOSS, Freeport.

Directors—

W. S. O'HAIR, Paris, Ill.

S. J. STANARD, Springfield, Ill.

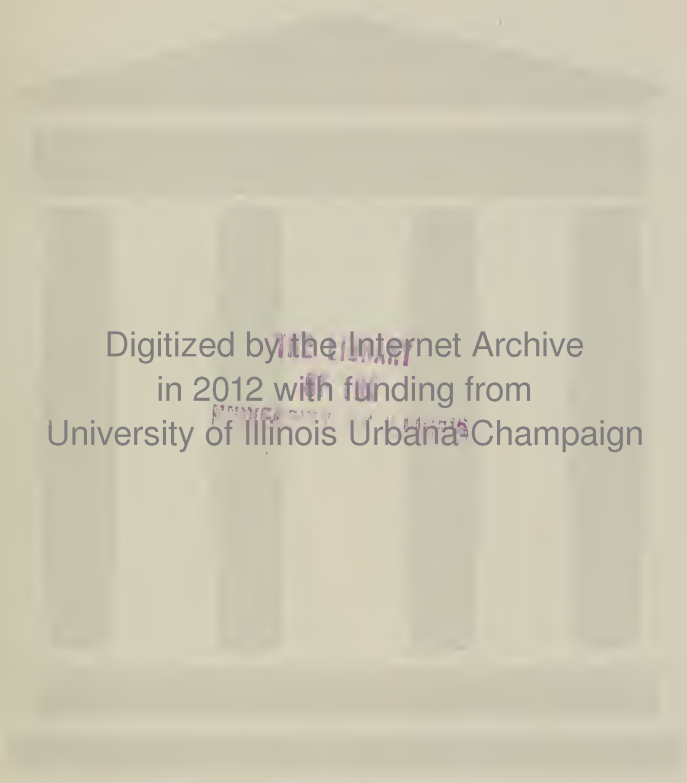
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STILLMAN J. STANARD
Director of Agriculture of The State of Illinois.

STILLMAN J. STANARD

Mr. Stanard is a young man and occupies the responsible position of Director of Agriculture in the cabinet of Gov. Small.

His appointment to this position was made on his record of excellent work as superintendent of dairy extension in the Illinois department of agriculture, and among his backers for the position were leaders in both the great political parties, men who had observed his work and had noted the good results of his efforts.

But besides the leaders he had the active backing of thousands who had benefited by his efforts in their behalf for a better agriculture. His appointment was made on merit.

Before he became Director of Agriculture he was a director and vice-president of Illinois State Dairymen's Association and a worker to advance the influence of the Association in its efforts for the dairy industry of the state.

Mr. Stanard was born in LaMoille, Bureau County, Ill., his father being an attorney in that town and owner of a dairy farm near the city limits where the family resided. When he was 13 years of age the family moved to Perry County, Illinois, where Mr. Stanard resided until he was 24 years old, most of which time he was engaged in farming and obtaining an education, except two years spent in the newspaper business.

At the age of 24 he went back to Bureau County, where he was connected with farming activities until he entered the state service in 1918 as Field Man for the Division of Dairy Husbandry under Lewis N. Wiggins, Superintendent. Upon the resignation of Mr. Wiggins two years later, he became Superintendent, in which position he served until June, 1925, when Gov. Len Small appointed him Director of Agriculture of the State of Illinois.

CONSTITUTION AND BY-LAWS OF THE ILLINOIS STATE DAIRYMEN'S ASSOCIATION

Name and Purpose.

Section 1. The name of this Association shall be the "Illinois State Dairymen's Association." Its general purposes shall be to promote the dairy interests of the State of Illinois and to disseminate knowledge concerning the same, to bring about more economical production of dairy products, the production of a better quality of dairy products, and to increase the consumption of dairy products

Membership.

Section 2. Any person who is a resident of the State of Illinois and who shall pay into the treasury of the association the sum of one dollar, shall be a member of the association until the first day of the opening of the next annual convention. Any person who is a resident of the State of Illinois and who shall pay into the treasury of the association the sum of four dollars shall be a member of the association for a period of five years from the first day of January preceding the date of said payment. Any person who is a resident of the State of Illinois and who shall pay into the treasury of the association the sum of ten dollars shall be a life member of the association and shall be exempt from payment of any dues with the exception of special assessments, which may be made by the Board of Directors on all members, which assessments shall not total more than fifty cents per member in any one year.

Honorary members may be elected by vote at any annual meeting of the association in recognition of services rendered to the dairy interests of the state, and such members shall be entitled to all privileges of membership with the exception of voting for officers, and shall be exempt from all dues and assessments.

Management.

Section 3. The full management of the affairs of the association shall be in the hands of the Board of Directors, which shall consist of a president, vice-president and five directors. Four members of the Board of Directors shall constitute a quorum to do business.

The Board of Directors may adopt such rules and regulations as they shall deem advisable for the government and conduct of the business of the association and may appoint such committees as they shall consider desirable.

They shall also make a biennial report to the Governor of the state of the expenditures of the moneys appropriated to the association and arrange the program and order of business for the same.

Elective Officers.

Section 4. The president, vice-president and Board of Directors shall be elected by ballot at the first annual meeting of the association. Only five-year or life members shall be eligible for election to the elective offices or Board of Directors. A plurality vote shall elect.

The elective officers and Board of Directors shall take office immediately following their election and shall hold office for one year or until relieved by successors who have been duly elected and qualified.

Any vacancy which may occur among the Board of Directors or officers may be filled by the Board of Directors for the unexpired term.

Appointive Officers.

Section 5. The Board of Directors shall appoint the secretary and treasurer who shall take office upon the first day of July following their appointment and shall hold office until relieved by duly appointed and qualified successors.

Headquarters.

Section 6. The headquarters of this Association shall be where the secretary has his place of business.

Annual Meeting.

Section 7. The association shall hold its annual meeting at such place and time as shall be determined by the Board of Directors, not less than thirty days in advance.

Duties of the President.

Section 8. The duties of the president shall be to preside at the meetings of the association and of the Board of Directors. It shall be his duty, together with the secretary, to arrange a program and the order of business for each regular annual meeting of the association and of each meeting of the Board of Directors and upon the request of five members of the association, it shall be his duty to call special meetings of the Board of Directors, or he may call meetings at such times as he deems advisable.

During the first day of the annual meeting of the association, the president shall appoint in open meeting a committee consisting of three members of the association, which committee shall place before the convention nominations for officers and directors of the association for the ensuing year, their report to be made not less than three hours after their appointment. The president shall at the time of the appointment of the nominating committee indicate in open meeting when the election of officers shall take place.

The president may, at this meeting, appoint whatever other committees that to him may seem advisable.

The president shall be a member ex-officio of all committees either appointed by him or by the Board of Directors, with the exception of the nominating committee.

Duties of the Vice-President.

Section 9. In the absence of the president, his duties shall devolve upon the vice-president.

Duties of the Secretary.

Section 10. The secretary shall record the proceedings of the association and of the Board of Directors. He shall keep a list of the members, collect all the moneys due the association and shall record the amount with the name and postoffice address of the person so paying, in a book to be kept for that purpose. He shall pay over all moneys to the treasurer, taking his receipt therefor. It shall also be his duty to assist in making the program for the annual meeting and at the close of the said meeting compile and prepare for publication all papers, essays, discussions and other matter worthy of publication and cause to be published and distributed to members at the earliest day possible and shall perform all such other duties pertaining to his office as shall be necessary. Any compensation for the services of the secretary shall be established by the Board of Directors.

Duties of the Treasurer.

Section 11. The treasurer shall before entering upon the duties of his office, give good and sufficient bond to the directors of the association with one or more sureties to be approved by the Board of Directors, which bond shall be conditioned for the faithful performance of the duties of his office. He shall account to the association for all moneys received by him by virtue of said office and pay over the same as he shall be directed by the Board of Directors. No moneys shall be paid out by the treasurer except upon order signed by the president and countersigned by the secretary. The books or accounts of the treasurer shall at all times be open to the inspection of the members of the Board of Directors, and he shall at the expiration of his term of office, make a report to the association of the condition of its finances and deliver to his successor the books of account, together with all moneys and other property of the association in his possession or custody. The treasurer's bonding fee, if there be any, shall be paid by the association.

Quorum.

Section 12. Seven members of the association shall constitute a quorum for the transaction of business, but a lesser number may adjourn.

Amendments.

Section 13. This constitution and by-laws may be amended at any annual meeting by a vote of not less than two-thirds of the members present. Notice of the proposed amendment or amendments must be given in writing and at a public meeting of the association at least one day before any election can be taken thereon. This constitution and by-laws may also be amended by unanimous vote of the Board of Directors present at a meeting called for that purpose, written notice stating purpose of meeting having been sent to all members of the Board not less than ten days preceding date of meeting.

CONVENTION AT CARBONDALE

Geo. Caven, Secretary.

From attendance of farmers and real interest on the part of those present, the fifty-first annual convention of Illinois State Dairymen's Association held at Carbondale January 20, 21 and 22, 1925, was conspicuous. Starting with a big attendance the opening day, the interest and attendance increased, and held up to final adjournment.

The convention was held at Southern Illinois State University, where the accommodations were excellent, and where ample provision had been made to take care of the crowd.

The real work of the meeting began at 1:30 p. m. Tuesday, January 20, and had to do with the dairy cattle exhibit. Several herds, besides the college herd, were on exhibition.

After an invocation, Prof. R. E. Muckleroy, head of the Southern Illinois State University dairy department, delivered an address of welcome which was responded to by S. J. Stanard, of Springfield. Pres. W. S. O'Hair then introduced Prof. R. E. Caldwell, Waukegan, Ill., who gave a dairy cattle demonstration talk, taking different animals on exhibition for examples to illustrate his ideas of dairy form and type.

Prof. Caldwell's audience consisted of farmers and farmer girls and boys who were there to learn how to judge dairy cattle and to participate in the judging which followed the lecture. The speaker pointed out the various characteristics of the good dairy type, told what constituted good performance and emphasized the influence of good care and proper feeding of dairy cattle.

As soon as the lecture was over those who were to participate in the cattle judging were instructed as to the rules, and the judging commenced.

Prof. C. S. Rhode, University of Illinois, was to have

had charge of the dairy cattle judging, but could not because of illness, and sent H. E. Jamison of the University in his place. The judging occupied the remainder of the afternoon. Mr. Jamison announced the individual scores as follows, there being 77 contestants:

Arthur Hodges	143
Robert Bissell	89
Robert Bullock	141
Carl McPherson	115
Alfred Rogers	186
Newton Simons	113
J. Piper	145
Edwin Grout	122
Weldon Lacey	97
Mardin Dale	76
Kelby Harlow	128
Merrill Hamen	123
James McBrion	87
Earl Modlin	121
Carl Fritschle	90
Carl Romack	165
Arthur Romack	147
Dayton Moore	73
Paul Glover	53
Milton Fix	112
Ralph Smith	136
Loren Works	107
Edwin Daubs	126
Herman Reid	125
Wm. Shilling	38
Glen Hedge	131
Harold Smith	106
Malcolm Mason	113
Thelbert Daubs	120
Mathias Weber	91
Arthur Hortin	98
Henry Sims	152
Elbert Hortin	118
Edwin Smith	106
Edward Banting	148

Herman Curtis	127
Vernon Harris	157
Harold Coyder	114
Marvin Newport	132
Henry Phillips	174
Glen Kirkpatrick	169
Russell Ramsey	127
John Lamb	130
Riley Taylor	147
Clarence Shoop	68
Russell Wilson	137
Clifford Worthen	100
Clifton Thompson	77
Andra Smith	116
Claude Newton	171
Virgie Kirby	54
Harold B. Nippon	85
Paul Grisham	116
Buelah Goodman	98
Muriel Brady	85
Robert Newton	115
A. L. Helms	168
Lyndell Boner	76
Willard Phillips	115
Noel Phillips	50
Clyde Wolland	121
Wm. Stevenson	138
Loren Black	84
Kingsly Fowby	113
Ferdinand Sweitzer	99
Henry Whelfley	113
Phillip Harden	148
Floyd Griffith	134
Charles Thomas	122
Earl Hill	87
Willard Walker	98
Aaron Bullock	72
Earl Simons	100
Henry Marlow	105

Clarence Mink -----	141
Andy Marlow -----	151
Sam Austin -----	123

The prize winners were Alfred Rogers, Mt. Vernon, first, score 186; Henry Phillips, Sesser, second, score 174; Claude Newton, Goreville, score 171; Riley Taylor, Sesser, fourth, score 147; Wm. Stevenson, Marion, fifth, score 138.

The State Dairymen's Association offered a silver cup to the winning team, each team consisting of three members and 10 teams were entered. The cup went to the team from Sesser, composed of Henry Phillips, Glen Kirkpatrick and Russell Ramsey, whose total was 470.

Second place for teams was won by the Newton team composed of Carl Fritschle, Carol Romack and Arthur Romack, score 402.

Third place the Albion team, Loren Work, Edwin Daubs and Herman Reid, score 358.

Tuesday evening entertainment was an address.

WEDNESDAY, JAN. 21, 10 A. M.

R. E. Caldwell.

Yesterday those of you who attended the work at the farm were, I believe, very much interested in the discussion of judging.

My remarks yesterday were concerned with the subject of breeding. I stated that throughout Southern Illinois there is one point that stands out above all others and that is, there has not been the proper attention given to the selection of animals designed for the purpose of producing milk.

There are four or five main breeds of dairy cattle, the Jersey, Guernsey, Holstein, Ayrshire and Brown Swiss. These breeds are the result of years and years of development. We have breeds that will test high in fat, low in fat and breeds of other peculiarities that make them fit well into your local conditions. So do not worry so much about the breed. Select the breed that best fits into the type of dairy business which you expect to carry on.

I would say in general that if you are in the whole milk business, make use of breeds of cattle that are classed as whole milk breeds, such as the Holstein or Ayrshire. If you are in the business to produce for a creamery or special market milk, a milk that is sold to the type of market that will appreciate quality and pay for it in proportion, then you can use the higher fat testing breeds.

Another feature involved is climatic conditions. In this country you have relatively mild climate, an almost ideal Jersey climate. The Guernsey does well here and the Holstein, I understand, also does well. The mere selection of one of the breeds mentioned, however, is no criterion that they are profitable cattle. In other words, you can get pure-bred animals of these various breeds that are unprofitable. It rests with you individually to select the breed that you desire, one that you personally appreciate and enjoy and can work with happily and profitably.

Then again, there is the matter of selection within that breed. It is purely a problem of selecting your breed and then building the individual animal up to a profitable point.

It is said that the average cow of Illinois produces around 160 pounds of butter fat per year. I do not feel that that is hardly fair to the average Illinois cow. I believe that the average Illinois cow produces 160 pounds of butter fat per year because of the fact that you don't take sufficient care of them. It has been quite conclusively demonstrated that you can take a cow that maybe produces 160 pounds of fat per year, take proper care of her and perhaps make a 200-pound-fat cow out of her. Give the cow the very best conditions under which she can operate and then, if she does not produce, part with her.

I do not believe it is desirable for you to bring in too many cows from other sections. I would rather see you take the native stock here and select the best producers through the careful weighing and testing of the milk, then take those cows that are best and breed them to a bull of pure-bred quality. But you should bring in bulls whose dams' records have shown their dams to be producers.

Grow those dairy calves carefully. Develop them good, give them a chance and in turn breed them to a bull of still better ancestors. By careful breeding and attention it does not take many generations to bring up a herd to a production of 350 pounds of fat per cow.

One thing that we hear a great deal of late about is the poor condition of the farmer, about the farmer being so hard up, the importance of organizing and all of those things, and I may differ very markedly with your opinion, but I am going to say this: Your organizations of an agricultural character, measured from the standpoint of their benefit to you, in my opinion, are something like this:

The organization that you are tied up with that is designed for education, whether it be the Farm Bureau, whether it be the Illinois State Dairymen's Association or whether it be any other group, so long as that organization is designed as an educational medium, that organization is

going to be an efficient thing for you. It is going to yield you well. But if you look upon organizations as a means of getting a group of men and women together so that by being organized you can lift yourselves out of the mire, you are kidding yourselves. It can't be done! You'll have to apply practical and efficient methods to your business. Get your hogs on a little more profitable basis, take your dairy cattle and put them on a profitable basis, get your 100 or 200 hens on a profitable basis, employ efficient methods in the various branches of your work, and then, and in that way only, do I believe it is possible for the farmer to lift himself financially.

There may be some great legislative opportunities lying open that will be taken advantage of to improve the agricultural class. It would be desirable for such a thing, but there are other ways of bringing this about. It is a general consensus of opinion, and we can find it quite conclusively demonstrated by thousands in this state and other states, that the farmer who follows the policy of breeding his dairy herd carefully, culling and housing flocks, hogs, beef cattle and horses so that they are a little better than the other fellow's, that farmer is usually progressing very nicely. He is about as satisfied as in any other type of business. Is not that class of farmers over the United States generally prosperous?

The dairy cow is one of the most substantial types of farm animals that you can use, and the dairy business in general is a prosperous business. I live in Northern Illinois, up where we have lots of dairying. There are a lot of kickers there, as many as in any other section of the country. You can go into the best dairy country in the United States and you will find some of the poorest dairymen that live. But the average fellow is pretty well satisfied. There is not a day passes that there is not from one to five in my office. I talk to them and see their feed and labor bills and those fellows who are careful and go into cow testing associations recognize that there is a difference between cows and the great improvement brought about by the use of a pure bred bull. They house their animals well, under-

stand the science of feeding, look out well after their market and are not organized in associations or a striking group, but go out individually. The fellows that follow those practices are successful. Their farms are not being taken on mortgage. They are improving and building their farms up.

I can take you into Lake County, Illinois, and show you hundreds of dairymen there who are selling their milk at \$2.40, \$2.50 and up to \$2.75 a hundred, and their cost of production is less than half of that. One fellow in particular: he is just a hard-fisted old farmer. He has one of the finest dairy farms in Lake County. He gave me information on what his feed is costing, his production per cow, labor cost and general overhead and he was far from being in a desperate condition, selling his milk in Waukegan for \$2.75 a hundred.

From one end to another you will find in every community a certain group who are successful and a big percentage who are unsuccessful, and you will find that the successful man is almost universally the fellow who follows the recommendations of the State Department, the University and the United States Department of Agriculture.

Then take the matter of the Cow Testing Association. Professor Reed can tell you what they have done in Michigan along the cow testing association line. I heard him the other day. He told what they had accomplished there and how any man who has a half dozen or more cows can afford to stay out is more than I can understand. The cow testing association is a practical instrument placed in your hands for you to take advantage of. In my opinion, a good cow tester in your neighborhood is of the greatest importance to you. He will be a whole lot more valuable to you than the man who represents you in Congress.

You have some real talent here this morning and so I am going to give way, because I have the opportunity to discuss a specified subject tomorrow.

Mr. O'Hair: Well, we have a fine crowd here this morning and I know you are enjoying the speeches. Professor C. E. Reed of the Michigan Agricultural College will now give a talk on "Beginning in Dairying."

BEGINNING IN DAIRYING

Mr. O'Hair and friends from neighboring states:

It was with much pleasure that I accepted Mr. Craven's invitation to come down here and speak to you. Outside of Chicago, I have attended but few meetings in Illinois. We on the outside never figure that Chicago is in Illinois. We consider Chicago as just the United States and really do not feel like we are in Illinois when we get to Chicago.

I was brought up in Missouri, worked there for a good long while and spent some time in Indiana. It has always been my ambition to work in what we call a real dairy state, such as Northern Illinois or Michigan. I am in Michigan now and what is known as one of the real dairy states as far as dairy products are concerned. I thought perhaps that when I got into Michigan around some of our milk centers I would find real efficient dairymen. I did find some, but the number of inefficient and careless dairymen was far in excess of what I had expected. However, you will find poor dairymen wherever you go.

Now, Mr. Craven asked me to give a general talk on this question of dairying and I hardly know where to begin or leave off. I am not here to entertain you. I am liable to talk for any amount of time and hope Mr. O'Hair will stop me if I take too much time.

Milk and milk products is a big business and we ought to try to make the most out of it. A lot of people are concerned today about there being an over-production of dairy products in the country. I do not believe there is an over-production, but I think there is something else wrong and am not prepared to say what it is.

I believe in organizations of one kind or another—organizations for the right thing, not only of dairy, but dairymen and business and consumer to solve these problems. I am going to talk on the subject of organization a little bit this morning. Professor Caldwell has said a good many things about the general beginning of dairying and I am going to talk about some of the older things.

Some years ago the matter of cow testing associations was introduced. On every program there was always some fellow talking about cow testing associations and we have had it on the programs of the Illinois State Dairymen's Association from time to time. We refer to it casually, thinking that the farmers know something about it, but I am telling you the thing that I want to make plain, the thing we have got to do, is to go back to the fundamental principles of dairying. There is nothing new. Things are pretty much the same as they were twenty, thirty or forty years ago. But just the same we are always looking for something new. But before I say much more I want to ask a few questions. How many of you are breeders of pure-bred cattle? How many are keeping records of cow testing associations? How many are doing official testing? Three, or four, or a dozen? That is not enough! What is the matter with dairying? There is your answer. And that is what is wrong with the dairy business from the producer's standpoint.

There is a lot of difference between a cow that will give 150 and one that will give 200 pounds of butterfat in a year. What are your cows doing? That is the question we are asking our dairymen in Michigan. We are not going out and saying you had better join a cow testing association. But you must do something along this line to find out what your cows are doing if you would stay in the dairy business. You must know more about your own business if you are going to make it a success.

Some nineteen years ago we started this cow testing idea. The first association was established up there. They have gone along and we have never taken any particular advantage of this, but we are constantly spreading this gospel to the dairymen in Michigan.

Now we are taking that message and selling it to the farmers. My message to your association is that you have got to sell this thing and it has more bearing than anything else you can possibly do. We have got to know what our cows are doing if we are to keep in business. You can keep

the records yourselves, but you won't. So my plea is to get somebody to do this for you.

This condition exists not only in Michigan or Illinois, but all over the country. Do you know what per cent of the cows in the United States are on test. There are less than one per cent out of twenty-four million cows. I am telling you, you cannot tell what your milk is producing unless you have the necessary facts and records. That is the big thing in the dairy business.

To you men beginning in this business, my plea is to find out what your cows are doing. Know what your cows are doing, each one individually, and until we have done that, we do not know whether our business is on an efficient plane or not. You absolutely all have to agree to that if we are to stay in business today.

Three and one-half per cent of our Michigan cows are members of cow testing associations and it certainly has made a difference. Right in the milk section, over 2,000 dairy cows have been sold during the past year because they were unprofitable.

About eight per cent of the cows on test last year were sold for beef. It goes without saying that it is the best dairymen we have got in the cow testing associations, but out of the three and one-half per cent of the cows in the state on test eight per cent of these were sold as unprofitable. I ask you this question. If we had, say 50% membership in cow testing associations, what per cent would go to the butcher?

So we have got to turn the spotlight on our barn. You say you cannot afford it. The thing to say is that you cannot afford **not** to do it.

Those who belong to cow testing associations are the men who are going to stay in the business. There is no question about it. We have got to put this thing on an efficient basis and I do not know of any other way than through the cow testing association. Any man who has got more than six cows certainly ought to be a member of an association.

A county agent up in Michigan told me a few years

ago that the farmers did not want cow testing associations. I told him that they probably did not realize the advantages. He said he thought he could get them interested. He went from one to another, asking them what their cows were doing, what their milk was bringing, what their feed costs were and pointing out the advantages of keeping records of their cows. And today he has got ten associations and more than two hundred men keeping records. Ten associations in one county! And what are they doing? They weed out more than ten per cent of the cows on test and their milk last year cost them less than \$1.00 per hundred. They were getting something like \$2.00, \$2.65 and up to \$3.00 per hundred in the early part of the winter. That includes just the feed cost alone.

We have not begun to think about the cow testing association in the right way as yet. What we want is records. I saw the Scotch milking cows and they can show us a lot of things. However, I do not believe we can go over to Denmark and those other countries and apply their methods here. You can set the whole country down right here in one of our States.

I saw the records of 36,000 cows in Scotland. One cow in particular averaged over a forty-week period 7,500 pounds of milk in a year. She did it on grass and grass alone. They do not keep cows that are not profitable. They have got to make their living out of it and they have got the business down to its fine points.

I can give you dozens of instances in Michigan of men who have tried out various schemes for the past year, particularly the small breeder who never hopes to have a national reputation as a breeder. I can give you those men's names and they will tell you they have gotten more out of a cow testing association than they did out of any other plan.

From my observations, I would lay a greater part of the emphasis on the man who made the testing record than the record itself. And I want to say that we have less trouble with people trying to put something over in cow testing association work than in advance registration work. If a fellow gets a shady reputation and he comes out with

records that they do not believe the cow made, they will soon investigate. In advance registration work it is different. One man goes out to a farm and the others do not know a thing about it. They are not recorded or published.

I want to tell you it is just as important to have records of a pure-bred cow as records of a grade cow. But another advantage of a cow testing association, and a big advantage, is not so much that you have got the records, but to really know what they are doing and all they are capable of doing. In other words, the feeding through a knowledge of what they are producing and trying to feed them better. I know that is the trouble with a lot of our cows. There are a lot of good cows that should be classed higher, because they have not been fed right.

The other day I talked to a farmers' club in one of our counties. They were discussing radio and its possibilities. I asked these people how has it been possible to develop the radio? The answer is: because the master minds know all this is to know up-to-date about waves, etc. They are men who are trained and have gotten the last word of information on their subject. Otherwise, the radio would not be possible.

What about the farmer? Has the farmer got the last bit of information to be found out about his business? How many in Illinois have studied this problem. From one gentleman at this meeting, a man about 84 years old and who has lived on his farm all his life, I learned that he was feeding his cows corn fodder and timothy hay. I also found about fifteen others feeding the same thing—and complaining about the price of milk and cost of production. What else can you expect?

One of the biggest advantages of the cow testing association, the thing back of it all, is the fact that a man is hired, maybe a young fellow 18 to 20 years old, as your cow tester. He goes from place to place in taking care of his duties. You may think he is young, but if he has gotten the rudiments of feeding he will be able to give you some suggestions and work with you.

Our bankers have been responsible for the large num-

ber of 105 cow testing associations operating in Michigan today. We are trying to interest those kind of organizations, because they are looked up to and respected.

The feeding game is getting more and more complex all the while. There is a great deal of information, but only a little of it used—the old, old story of feeding. The cow testing association affords the opportunity of some real study along this particular line and I beseech you to try to get into it.

Another question—do you know what you want to do with your cows in the future? We would do well to think over this problem and, as we go along, weed out the poor cows. The fellow who starts out on any other basis is doomed to failure. You can tell by looking at your cows, but still there are a lot of dairymen in Illinois, and other states, too, going along without this knowledge.

Another thing a cow testing association will do for you: it will build up a greater community interest and a greater co-operative spirit among the farmers, so that you can do other things. Our cow testers are not only cow testers—they are working with the farmers and doing all they can to assist them.

We have got to get back to efficiency in production and efficiency in feeding. But it is only the men who see the light ahead and realize this fact who are going to succeed in the dairy business; the others will be forced to drop out. The market is always made on the basis of the efficient worker everywhere. If you are inefficient, you cannot compete with the efficient fellow in working, no matter what job you have got.

About bull selection—I want to say that the cow testing association offers the greatest opportunity of anything I know of in bull association work and development of pure-bred sires, because you know then just what they are doing. By testing both daughters of a bull and mothers of those daughters, they get a direct line on what those cows are doing. That is another big advantage and there are many other advantages.

Another thing I must speak about that belongs in the

category of the old, old story: you will never get anywhere without the right kind of blood. We must get pure-bred sires of good quality!

I have got a sale bill in my grip, running something like this: "I have decided to quit farming and offer for sale the following described properties," etc. I looked down the bill, and, evidently, this man was a dairyman. He had nine cows, with descriptions somewhat as follows: "One black and white, one red and white, one yellow and white, one roan," and so on down the line. And then he had the nerve to say he had decided to quit business. He never decided to quit anything—it was decided for him. (Laughter).

You can see those kind of cows around everywhere. Let me tell you something—that farmer knows better than that. He can't afford to own a pure-bred dairy sire. I am telling you the facts. If you buy a bull worthy of the name, one capable of producing an increase in your grade cows, and pay the breeder the cost, you cannot afford to own him. I have seen one fellow go out of business for no other reason than that he bought too many bulls. He had over \$5,000 tied up in Jersey bulls and it broke him, because he couldn't afford to own them. You buy a bull from Mr. O'Hair here and I don't think he would take less than \$100 or \$150 for him. He couldn't afford to do it for less than that. You will find that your service fee for heifer calves will cost you somewhere from \$10 to \$25 apiece.

I repeat again that the average farmer cannot afford to own a pure-bred sire unless somebody gives it to him, and the sooner we realize it the better it is going to be for the farmer. How are you going to remedy the situation? The only way to do it is by having three or four men get together and own the sire. You say it can't be done. Then, if you say it can't be done, it can't. But I know it can be done.

We must have good sires, because we want our offspring to be worth something.

You may be interested to know that in communities where there are cow testing associations, they are quoting

cows out of these associations from \$25 to \$50 higher than the ordinary grade cow.

The dairy industry is moving west and the center of the dairy cow population in the U. S. today is right here in Illinois. We are now in this dairy center. Your big job here is to grow surplus cows. You will never find a fellow coming up here to buy calves out of scrub sires.

So my message to you and in conclusion, I want to say I may have rambled a bit, but I hope you have got my message, the message of better cows through weeding out those poor cows, of greater profits through better records and better feeding, of better cows through pure-bred sires. (Applause).

Mr. O'Hair: Now, we have a gentleman here who has come all the way from Iowa on the C. & E. I. and you know what that means. I am sorry we haven't but one hour and fifteen minutes for him to speak. He is perhaps the biggest breeder and best judge of cattle in the world—Professor Van Pelt.

Ladies and Gentlemen: One thing you people in Illinois are mighty fortunate about is having O'Hair here in your state. Everytime I look at him, I think about the lady in California who was riding with a friend on a street car.

In the course of their conversation, she made this remark:

"I do not like Los Angeles; there are so many Irishmen there."

Her friend replied: "And I do not like San Francisco; there are too many Irishmen there."

Now it happened that there was an Irishman sitting behind the two ladies, and, overhearing their conversation, he leaned over and blurted out: "Yez can both go to hell; you'll not find any Irishmen there." (Laughter).

I never see O'Hair but what I think she is right.

I just hardly know what to say to you people. I had a fine address made up, but Professor Caldwell took part of it and Professor Reed took the rest of it. So I have nothing left. If there is anything left to tell, I do not know. What

I am going to say, I doubt very much if it will appeal to those of you who are here.

I always like to feel when I give a talk that I have dropped some suggestion that you can take home to make things better. I can tell you absolutely that your time is wasted here today, and mine is too, if you just sit and listen and then go home and do not put these things into practice.

I am sorry that your wives are not here—they would see to it that you did some of these things. The week before last, in speaking before a dairymen's association, I noticed that there was not a man in the audience who had his wife along with him. I said: "Where in the world are all you fellows' wives. Why didn't you bring them along?" They did not like it very well.

You have heard a mighty good talk this morning from Professor Caldwell and Professor Reed gave one of the best talks on the cow testing association that I have ever heard. I just want to take up a little addition to what he has said.

We were organizing a cow testing association over in Iowa a good many years ago. I firmly believe that the testing association is one of the greatest things for a community and its prosperity. I have noticed over and over again in our state that when the year is up it is necessary to go right back and sign up the members all over again. And it is no soft job to get them back in the association year after year. Undoubtedly, if it is good for a man one year, and for a community one year, it is good for a period of years. Every year it leaves the individual and the community so much better.

I was just hoping that Professor Reed would go right ahead and analyze the results of associations.

It occurs to me that there is probably a reason why these associations do not live. In all lines of business they have bookkeepers and they keep a lot of figures. They keep so many figures that, by the time they get the figures together, the year is over and we have lost money. And these figures amount to very little unless someone in the organization sits down and analyzes and figures out what

they mean and what is the logical thing to do in order to accomplish the result for which the figures were compiled.

About the only analysis I ever heard of testing figures is that this cow lost money, this one made money and this one should be killed. That doesn't mean that testing cows should not be done. I think that when the year is over we should make a very careful analysis of our figures and find out whether the cow should be killed or the man who owns her.

There are a lot of purbred cows who, in their first year, or perhaps the second year or still another year, may not be very highly productive, while cows standing right alongside of them will show highly satisfactory results. But the next year their positions may be reversed. These are things that should be taken into consideration. The great value of these figures which result from the testing association is to show us that there is something wrong and the first thing we will probably find is that we haven't been feeding the cows properly.

I do not believe for a minute but that our average production can be doubled if every man who owns cows wishes to find out what the situation is and then go ahead and get busy doing the things that are necessary to make those cows produce what they are capable of producing.

I bought the poorest cow in a testing association and I was told she was absolutely the poorest cow in the world. However, I took her home simply as an experiment. The very next year she made 593 pounds of butter fat. In spite of the fact that this cow by her records had been proven the poorest cow in the world, her looks defied the records. Then what was wrong? The answer is: she was not fed and cared for properly.

Now I am relating this little incident to you men and women to try to bring out what the great value of these records are. These records point to the fact that certain cows should go to the butcher. How can we ever get over-production if we will not do that which is necessary to permit our cows to produce, but send them to the butcher?

I believe we should tackle this proposition from a

standpoint of analyzing these records with care. Maybe a cow will have an off year, just like an apple tree which sometimes produces more one year than another.

We had a cow one time that made 400 pounds of butter fat from 10,900 pounds of milk, freshening at a year and eleven months. The next year that cow did not give enough milk to wet the bottom of a pail. Everybody was disgusted with her, and then she freshened with her third calf and she was a wonderful producer. She brought \$1700 at an auction sale in Chicago. These are factors we must consider. Use judgment and common sense!

And that leads up to another thing: In bringing out the value of the cow testing* association as compared with official test, Professor Reed told you things that are absolutely true. We have come into a time when county agents are inquiring for purbred sires to put at the head of grade herds when they can afford good bulls. They insist they won't have a bull out of a cow that hasn't made six or seven hundred pounds of butter fat. There are two things which they are encouraging to be done. The first thing is to try so hard for big records that they put the farmer out of business. And the second thing, they are encouraging the development of breeds to try for such records, which also has the same disastrous effect.

I think Professor Reed has attempted to illustrate to you that we should not go to extremes on these things. The safe thing to be guided by in business of every sort is general average. I have often made the statement, and I know Mr. O'Hair will agree with me, that if a bull's mother has a big enough record, I do not question the matter at all.

Bulls transmit only that which is inherent with them. They do not transmit man-made efforts; if you are milking two times a day, you can't expect that the daughters of a sire whose mother was milked three times a day will show the same results.

Now, I am not disparaging the great production records which are being attained. I think these records are wonderful things—they are great in that they show the wonders of the cow and what can be done with them.

But if we are in business to make money out of the daughters of our bulls, it is time for us to get away from these great extremes and select sires from ancestors that will produce five hundred pounds of butter fat.

That is the reason I believe it is true what Professor Reed told you regarding the value of cow testing association records. These cows perform under conditions somewhat similar to your own. I do not believe for a minute that we are going to make any great headway by going out and selecting cows out of these high-record dams. In a way we are working against ourselves. Professor Reed told you that you have got to do your part and raise the bull's daughter pretty well.

When I was down in the South a cow had broken a world's record when she made 1140 pounds of butterfat. And their one hope was if they could only have a son out of that cow. I explained to these people that this cow was probably not as good for that purpose as a more normal cow. If you fellows had that cow and treated her like you treated your own cows, she would not do it. She would not live. That cow could not stand what your cows have got to stand.

That is the situation. If we will begin satisfying ourselves more with average production in selecting our sires, we will be better off, and as Professor Reed has told you, organize associations and get these sires and keep them long enough to know what their value is.

A very great mistake we are making is that we refuse to buy sires that have demonstrated what kind of calves they will sire.

The second mistake we are making is sending a bull to the butcher after he has served his purpose. A very large percentage of the best bulls produced have gone through this channel because men are thoughtless and do not want to be troubled to let a neighbor use the sire for a year or two. Very few live after two or three years old.

If we would get together in our associations and our communities and buy them jointly and pass them around to the next community and keep them traveling around where

they can do the most good, instead of sending them to the butcher, then we are going to make very great progress indeed.

All sires when they reach a certain age become more or less hard to handle; more or less vicious. I would not encourage anybody to take a chance on a bull of this kind. But I have always believed that the intelligence of man is sufficient to cope with the intelligence of a bull provided he is willing to make the necessary effort.

About the only message I can bring to you this morning, in addition to what has been said, is just a sort of summing up, so that you can take these things home and put them into practice.

If there is any one thing which has been said that I want to emphasize more than anything else, it is this:

Do not wait for somebody to organize you. Get together and go into a cow testing association on the basis where your records are made for the purpose of analysis and get some real value out of it. Find out for yourself whether the cow should go to the butcher or whether you should take a little better care of your cows.

The first fundamental principle of giving a cow a chance to give you production, as vindicated by the tests of the association, is to feed them enough. We do a lot of worrying about balanced rations, when really we should not have to be doing very much worrying at all. We have not reached the point where we are feeding our cows enough when we are giving them enough to eat. After you do that, begin figuring out whether it is the right feed or not. Let's keep this one thing firmly fixed in our minds: we are going to give our cows enough to eat.

I am talking from the standpoint of the dairy industry. I know all of **you** people here give your cows enough to eat; I am talking about your neighbor. (Laughter).

When I say give them enough to eat, I mean 365 days of the year. I do not know of anybody who would give their cows enough to eat one day and not enough the next day and expect to get very big production by that procedure. That is not a good way to make milk profitably.

But really, gentlemen, all over the United States and up in Canada, I have seen the majority of people feed their cows in the winter and starve them in the spring; feed them in the summer and starve them in the fall. Ninety-nine per cent of the cows in the United States are so busy getting in and out of condition that they do not have time to produce butter fat. If the summers were long enough, they would all starve to death. You will not find many cows throughout the United States that get enough to eat during the summer months. We are the most wonderful people in the world for feeding during the winter time.

We are approaching that season now when ninety per cent are going to make the worst mistake—when we reach the first day of May, that is a sign for the cows to go to grass. It makes no difference whether there is any pasture or not. It is May 1st according to the calendar and they have got to go. And when the cows go to pasture, that is a sign we are not going to give them any more feed until we put them in the barn again.

I venture to say that this is the great reason for low production: poor cows and poor pastures.

We turn them out with little grass, with no feed value, and the cows are just stimulated by the grass and begin producing heavy. This makes us feel fine for a while. But the cows are losing weight and the process of starvation is started. We are satisfied and do not pay much attention.

We find that the cow has cropped the grass down and eaten three or four times the grass that she needs or would eat and she gives us a lot of milk. From that time on to the fall, her output steadily declines.

If we would only keep our cows in the barn for a couple of weeks longer. Keep your cows in until the grass gets nearly knee high. Don't pay any attention to the calendar. Look at your pasture, watch it closely and determine when it is ripe enough to turn your cows out.

I expect that your cows, after they get grass, won't eat very much silage or hay or feed, but it is a mighty good plan to feed them a little. Don't think just because your cows are out on pasture, whether there is grass there or not,

that they are going to give milk. They really don't get the food value that is necessary out of that grass to make good production.

So watch your pastures and milk pail. Along in July, when the flies come, there is no grass and everything is dry and dusty, the cows are getting nothing to eat. Just remember she is a machine and if you see her coming down in milk flow, begin feeding her a little more, even if it is only green forage.

A little summer silo is of just as much value as a big winter silo. I have a friend over in Ohio who takes mighty good care of his cows. I saw him some time ago and he told me he was getting along fine. He said: "I have made my cows give as much milk in the summer time as in the winter. I have a summer silo and it has worked out wonderfully."

You do not need to watch your production if you will just see that your cows get in good condition.

Our ancestors had these great extensive prairies, with not enough cattle to eat them down and sent them to pasture in the winter time. They did not need much feed, because the grass was so high and it kept the flies off of them, etc. But now we confine our cows to little pastures where the grass is short and dry. They can't even eat the grass along the roadside. Now we have our silos and feed them in the winter.

Just let me tell you one thing: when you join your cow testing association, be sure you take hold of it properly, analyze correctly the records which are made and watch what the reason is from season to season and year to year why your cows are not producing economically and correct those little conditions as you go along.

After all, if we are really milking cows for profits instead of for recreation, we should watch these things and give our cows the chance they ought to have. I think we will find quite a large percentage of cows that will make a profitable flow of milk and butter fat.

Then, too, we have got our bull associations and I think they are more valuable than the cow testing association.



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The bull association goes right along with the cow testing association and I think if I could not have both of them I would take the bull association in preference.

So if you will see to it that the cows' grandmothers have good records, not extreme, and the great grandmothers have records several generations back, these records when you average them up is about the production you should strive for.

Then see to it that the bull is strongly bred and is going to transmit these things to his offspring. Keep bulls to produce daughters that will produce the amount of milk and butter fat that is desirable. There is a great law of breeding that we call reverting, which means that the calf of the sire may trace back several generations.

When you do these things and take care of your cows, go ahead and mate them with good sires and raise heifer calves, it will mean gradual improvement generation after generation with a large degree of certainty.

Thank you very much for your kind attention. (Applause).

Mr. O'Hair: Friends, there is no use of commenting on what has been said this morning. The day is going to be full. The men who talk to you this afternoon are real dairy-men and you cannot afford to miss hearing them. I am not afraid to say that you folks have the best talent in the United States during this meeting. Now, our time begins at 1:40.

WEDNESDAY, JANUARY 21, 1:30 P. M.

Mr. _____: We have a full program this afternoon and we want to get all out of it we can. Mr. O'Hair has requested me to proceed in his stead until he comes. The first number on our program is "Better Cows, Feed and Care," by Mr. Dorsey, Moro, Ill. We shall be pleased to hear from Mr. Dorsey.

BETTER COWS, FEED AND CARE

By L. S. Dorsey.

Mr. Chairman, Ladies and Gentlemen:

I feel that this convention has honored me above all others who have been named on the program today. We dairymen are from the farm, but if I have it right the only real dirt farmer who is on the program today is myself.

I liked the talks that I heard this morning. They were interesting and instructive. We ought to get more out of these talks than we do. We ought to get the bulletins from our State Department if we do not have them and we ought to think well of these men in their work, because they teach us many things which we should know. But I want to tell you that this afternoon it seems to me that I am very fortunate to be the first one to come on the program, because we all like to hear the fellow who comes from where he has learned more than we can get from the real dirt.

Many a man has gone broke trying to solve how to get rich on this proposition. There are three classes of dairymen who are not a success: one is the man who trusts all to his organization; another is he who trusts all to his purebred cows; and in this section of the State, which we call

Egypt, another class of dairymen who are never a success are those that do not use lime.

I am not saying we should not have organization—the speakers here this morning said we should organize. We **should** have cow testing associations. We are here as a State Dairymen's Association to help us in the production of milk and we ought in our day certainly to have an organization that works with the distributors, sits in with them and talks over the price we are to get for our product.

I am not here to say that pure-bred cows are not good. They are good and the man who can get cows such as we were told of this morning is a very fortunate man and I do not see how he can fail to get rich.

And then, he who does not use lime is one who does not raise all of his feed.

If we who are in this business do not raise all of the feed we possibly can, we are not going to be the success that we would be if we raised the most of our feed.

Then, I think that I know of three classes of dairymen who are a success:

You may not have thought of them in this way, but one of the men whom I think is a success nearly every time is the man who milks regularly. Do you do that? Do I do that? Why not? Other things are pressing on us and the time of milking varies. We can't milk our cows regular on that kind of basis.

Another class of dairymen who are successful are those who keep their cows warm. We may think it does not hurt to turn them out in the cold, but it does, and a cow is not at her best unless she is comfortable and warm. It does not cost a fortune to keep them warm. I am not advocating high-priced heating devices. There is very little expense. We can make our stable warm with very little added expense and with very great returns. The main thing is to fix your barn up so as to prevent draught and cold from penetrating.

These people that I have named are all progressive dairymen. I see them and I know them.

We all have experimented. I do not mean by that that

we have been running experiment stations; at least, I have never done that. But I have seen others doing a certain thing which I thought would work out successfully if I tried it. Sometimes it has not paid me and sometimes it has cost me a considerable amount of work.

I am not here to argue with you about any of these things that I have done or left undone, but I am here, as the Irishman said, simply to tell you. I am supposed to talk to you about better cows, better care and better feeding. I am trying to get along that line.

I have in my hand a picture of a cow that is giving thirty-seven thousand pounds of milk a year and making fifteen hundred pounds of butter in the course of a year. I also have here a copy of a check from a man who is selling milk to the largest receiving station there is close to Carbon-dale, from where the milk goes to St. Louis.

They have over 800 patrons and this man's check for the month of October was 228 pounds of milk, for which he received the great sum of \$3.80. Think of that! One cow was making 37,000 pounds in a year and the contrast with this man's record. I do not know whether he sold milk for the last day of the month only or what the situation may be, but that is all the money he got from his herd of cows. But I do know that this station, with over 800 patrons, is now receiving about 37,000 pounds of milk per day and that is between 40 and 50 pounds of milk per man.

Now, what we want to get at this afternoon is a happy medium. We do not want to be away down below that average.

The thing that we want, brothers and sisters, is the cow that we can manage successfully and, whether that cow be a pure-bred cow or whether she be a grade cow, let us do our best with her.

Some years ago, we had on our place a cow that was doing fairly well. She was making three gallons of milk a day, but every time I started to milk her, up would go her leg and I would have to watch out. It did not increase the flow of milk any and I got angry at the continued repetition of this annoyance. So finally I said to my son: "We

will have to sell her." But he had different ideas about the matter and advised me to hold on to her. Just to show you how these things sometimes work out, this cow came fresh last spring and she gave us four gallons of milk for at least three hundred days. We think she has done very well.

Some people say we should feed our cows and feed them liberally while on pasture, but our cows merely get a taste of food. We have found that this practice works out pretty well.

Now, we were told this morning that the thing for us to do was to get a good sire and raise good cows and it seems to me that getting better cows is the great thing for us to do. There was a man in the Northern part of the state who discussed this subject with me and, by the way his name was the same as mine, Dorsey. He sold cows, Holstein cows, by the carload and, incidentally, distributed t. b. all over the country.

Now then, we can't go out and buy a sire here or there, because we don't know what we are going to get. We have got to use our best judgment on this animal as to breeding qualities and then we have got to use our judgment on the man we are buying from. It is not always what you pay, but what you get for your money is what counts. Let us always try and get the most for our money.

Raise all the feeds you can. This is of great importance and, if we are going to be successful, that is the one big thing we have got to do; and then, we should raise the right kind of feed.

I heard of an Irishman who went out to get a job on a farm. He was green and the farmer assigned him to the job of feeding the stock. He fed the horses, cows, hogs and geese alike. When the farmer asked him what he fed the geese, he told him hay. "Did they eat it?" the farmer asked, and he replied: "No, but they were talking about it when I left." (Laughter).

We have these different feeds which we are talking about and the thing to do is to get the feed best suited for our own particular needs. Lime was a hard thing for me to get confidence in. When my friends told me about it, I

thought it was just another one of those silly ideas we often hear about. But, after a while, I also got the fever and thought it would pay us to send to Chester for lime at sixty cents a ton and 60c more for freight and try out the idea. We did so and were wonderfully surprised at the results obtained.

We had been having trouble with our alfalfa for some time and I finally decided to lime our ground and then spread it with manure. We would plow the ground along in the spring and spread the lime on two to four tons to the acre and then put on about fifteen or twenty pounds of alfalfa seed to the acre. And, since then, we have not had one failure.

It certainly ought not to be very difficult for us fellows who are dairymen to get enough manure to put on our ground where we are going to sow alfalfa or clover.

Our rations for cows cost us some money. I cannot make milk as cheap as our brother stated this morning it could be made in his state. That ration costs me, on the basis of prices today and with cows giving an average of four gallons of milk a day, about \$1.95 per hundred, to say nothing of the labor involved. And I think I am producing much cheaper than others I know of. We ought to get this ration and get the right ration and we ought to save all the feed we can and still feed liberally.

A fellow out in our country had the tendency to live fast, but the old folks constantly cautioned him to save. After a while, the boy got married and he remembered what his folks had told him. He got married and went off with his bride to the city, went into the best hotel he could find and took the best room in the place. After staying there five days, he went up to the hotel clerk and asked for the bill. The clerk pondered a while, then replied: "Ten dollars a day, five days, \$50 apiece. That makes \$100." This fellow let on they had no meals there, but the clerk said: "That doesn't matter. They were here for you and you will have to pay for them just the same." The boy told him he'd see him later and went up to his room and packed their things up. When he came down again, the

clerk said: "Well, ready to settle now?" "Yes," he replied, "but I've got a little offset on you. It will cost you \$5.00 a day for squeezing the hand of the bride and \$5.00 a day for kissing her." The clerk became indignant at this and said: "Why, I didn't squeeze her or kiss her." And the boy said: "Well, it was there; it was your own fault if you didn't." (Laughter).

Mr. Fraser is another one who is coming on the program after a while. I read just the other day something by Mr. Fraser, to this effect. "Get the cow fit, get the ration fit and then get the crops fit." And in that sentence, he has told nearly the whole story.

We ought to have a ration for our cows that produces the most economically—the cheapest with the least expense—and then that ration should be a ration that just fits the cow and is just what we need to sustain the cow and make her give the production. And when we get that cow and get the ration that fits her, then let us fix our farms so that we can raise that particular crop.

The care of a cow has much to do with it. Our carelessness with these animals is responsible for many of the losses that we have. Kindness and consideration for the comfort of the cow has a whole lot to do with making a success in this business.

It used to be that my cows were like others that we heard of this morning—with uncertain production. Now, with these better cows that we have raised, we find that we have trouble in getting them to go dry before they calve. And in six or seven weeks they will freshen again. We are kind to them and our care is going to add much to the length of time these cows will give milk and the amount they will give.

Then my idea is that a cow should make a ton of manure, enough to cover an acre of ground, in a year. We have been doing it for a number of years and it takes quite a bit of labor. Our barn is 75 feet long and about every day we must go and get out a load of straw and put it in there for bedding. It keeps the cows clean and warm. We have leaves packed in to keep the cold out and in that

way we have managed to cover twenty acres of ground a year with manure. Now, if you can't make that much manure, make all you can. You may think you will get lots of manure from the straw stack, but the manure doesn't count very much that we get from the stall, because there is nothing to it. By taking the same straw and putting it in the shed, you have got something.

It is very important that we have water for our cows; good water and plenty of it. During the winter time, have it without any ice in it and have it where the cows don't have to go out in the cold to get it. It is not very hard for us to take better care of our cows, to be kind to them and give them enough water.

Give your cows lots of salt; make their feed salty. Our grain ration for a day consists of the following: 200 pounds of ground oats; 200 pounds of ground corn; 100 pounds of bran and 100 pounds of linseed meal. That is what makes our ration cost \$1.95 per hundred, because these are high-priced feeds, and in this grain mixture there is always a little salt. We figure that the cow likes its feed flavored with salt just as well as we do. There is always a quantity of it in the shed where the cows have free access to it.

We may think that if we have better cows and better sires our calves are going to be good and first-class. I am very well satisfied if our cows go so that we can keep one-half of them and get them to be better than before. It is of importance to get our cows so that we can save all of them and have all of them good cows. But sometimes a calf or heifer may come in and may not be well the first year. We ought always to keep them for the second year at least.

Sometimes we think that the thing for the farmer is political help. Mr. Coolidge intimated in his talk at Chicago that he is for the farmer to save himself. The trouble with us is that we never fight until we get mad. We ought to be continually in a good-natured fight for our rights wherever we are and whatever we are doing and not wait until we get good and mad before this fight takes place.

Then, another thing that keeps us from being success-

ful is that we don't pull together, which reminds me of a little story: There was a fellow and his wife out on the road driving along and just ahead of them was a fellow with a heavy load and a fine team and they were pulling for all they were worth. This man and his wife were the kind that were always nagging each other and the man said to her: "Why can't you and I pull together like that." "We could," she said, "if there was only one tongue between us."

Let's get our tongues wagging the same way. In our organization work, let us not think of the things we have undertaken and failed, but let us get together and do the best we can.

Now, I do not know whether you have gotten anything of what I have said out here. I have tried to tell you in my own way how I have attained a measure of success in this business. If you have gotten anything out of it that will make you like the business better, I shall be thankful.

If you are in the dairy business and do not like it, sell your cows and give it up. There are many other things you can make a success of, so don't follow dairying if you do not like it. With me, it is the best in the world. (Applause).
Chairman: Is there anyone who has any questions to ask Mr. Dorsey?

Question: What is a balanced ration for the cow when you can't have silage?

Mr. Dorsey: I think Mr. Fraser would be better qualified to answer that question than I would.

Mr. Fraser: I think it depends on what kind of hay you were feeding. If you are feeding all alfalfa, you want an entirely different grain ration. You get so much protein and nitrogen in your legume hay. I can hardly give a very specific instance.

If you are feeding alfalfa and corn silage, you can feed in addition to that linseed and corn meal. The advantage of corn silage is its succulence, which is just as essential as

any other element. It is a natural feed for the cow, without which she cannot do her best.

Mr. ———: Mr. Chairman, over in my county, Madison county, we have 30,000 cows and I doubt if over half of our fellows feed anything else besides timothy hay. It is so easy for us to have something else other than timothy and we certainly should have it. We can raise clover and on most of our ground you can raise good alfalfa. Let us not make the mistake of feeding timothy hay to our cows.

Chairman: There is one thing I would like to emphasize that Mr. Dorsey said and that is, the water supply for your cows. Limit the water supply the cow gets and she will limit the production. The milk production is coming down just as you cut down on the water ration. About 80% of milk is water and, unless the cow receives in her ration or an opportunity during the day to drink enough water to produce milk to the limit of her capacity, she is not going to do it.

It does not cost us very much to supply sufficient water. Warm it so that the cow will drink enough of it. Unless the temperature is right, she won't drink it. I will now turn over the meeting to Mr. O'Hair.

Mr. O'Hair: There has been a lot said about feeding, but I have heard nothing said about soya bean hay.

Question: I would like to ask for a little information. I would like to know whether any of the dairymen have tried out any experiments on feeding soya bean hay and then feeding it ground in place of bran.

Mr. O'Hair: In 1923 we had the champion Jersey cow of the state. We had a little grinder to grind her soya bean hay and she did not get anything else in hay. I believe it would pay you to do that and I think the time will come when you will all be grinding your feed.

I will now call on Dr. J. J. Lintner, with the U. S. Dept. of Agriculture, who will talk on "Tuberculosis Eradication."

TUBERCULOSIS ERADICATION

Dr. J. J. Lintner.

Mr. President, Ladies and Gentlemen: It surely is a pleasure to be with you. I always like to attend meetings of this kind. You carry away from them constructive ideas, because there are none of us who knows so much that he cannot profit by the other man's ideas.

As your president said, let us apply the ideas that have been covered here and not go home with good intentions and then forget all about them.

The previous speakers have said nothing regarding the ladies. Although this is a dairymen's meeting, I believe that in the dairy interests, as well as any other, we need the ladies. In our particular line of work we find that sometimes the men are slow, while the ladies prompt the men to action.

It reminds me there was a meeting of this kind and the president of the meeting criticized the men because he didn't think the men were giving their wives the consideration they were entitled to. While it was going on, some of the men evidently felt guilty and did some thinking. One of them on his way home stopped at a florists' shop and bought a bouquet. Upon arriving at home, he presented it to his wife, and she started to cry. He inquired what the trouble was and she said: "Everything has gone wrong today. The baby fell down the stairs, the line broke and my washing fell down, and now you come home drunk. (Laughter).

The subject assigned to me needs no introduction to you. It is a subject that is receiving more and more attention all the time. I hardly know what to say to you people on it, because there has already been so much said and printed about it.

When I say that the program here today has brought

out constructive ideas on how to build up and maintain a profitable herd, I meant it; yet there is one fundamental principle that is most important and that is the health of your herds.

It is a sad mistake to try to build up a herd of cattle, either grades or pure-bred, unless you know that you are building on a foundation that is sound and that is health. From all outward appearances, we can tell practically nothing. It is only by examination and scientific treatment that we can determine the condition of our cows.

Why speak now of tuberculosis among cattle? You are fortunate indeed in this section of the state that the infection is so limited. If nothing less, protect your interests down here while you are building up your dairy industry. That is, don't permit anyone to ship any infected cattle and you buy them as healthy cattle. Insist that cattle brought here and sold be healthy, that they come in here with a test that is made by a creditable man and which has been made within a reasonable length of time.

I am getting away from the subject, so please excuse me. Nevertheless, we have in this state, as well as other states, unscrupulous dealers bringing unhealthy cattle through the various sections of the state. Unless an animal can come from a source that you know something about, have nothing whatever to do with it.

If the cattle come tested, let them show you a record of tests by some creditable man who is recognized. Then you are in position to know something of the source.

Tuberculosis in livestock has received more consideration in the last five years than perhaps any other agricultural subject, not only from the producers, but also from the consumer. Tuberculosis causes a greater loss every year than all other diseases combined.

Congress was besieged with a request with the view of controlling and eventually eradicating the disease. In 1917 a plan was adopted by the U. S. Livestock Sanitary Board. This plan was put in operation in every State in the Union. In Illinois we started to work in 1918 with no appropriation, very little co-operation and a great deal of opposition.

You people can hardly appreciate the conditions we had to contend with in the beginning of this campaign.

However, I am proud to see that the people of Illinois are taking hold of the advantages offered them and are going to clean up tuberculosis in a hurry.

I might say that at the last session of the Legislature they appropriated a million dollars for this purpose. We are testing about fifty thousand cattle a month and, with the presence of infection as we find it in Illinois, it costs about \$100,000 indemnity money a month. That will give you some idea of what finances are required to carry on the work as it is at present.

We have been carrying on area work in sixty-two counties at the present time. When we start at this work we devote our time to testing pure-bred herds, which in itself takes care of the part of the work that the plan was originally intended for. But the men with the grade herds wanted attention, too. We have been overloaded with work, beyond our ability to handle. This naturally has created demand from other sources in the way of supplying funds to take care of expenses.

Illinois is one of the leaders in progress made in tuberculosis eradication work. I am just here doing what I can to further the cause along and that is what the people of Illinois are doing for themselves. They are setting such a pace that the surrounding states are asking how it is that Illinois does it. I am proud of it and we are commanding the respect of the surrounding states by the way we are taking hold of this and doing it.

We have at the present time over sixty-one thousand herds of cattle under supervision in this state, representing nearly 600,000 cattle. I believe that speaks for itself. That is what the people of Illinois are doing for themselves.

I need not go into the thing and tell you what tuberculosis is. Tuberculosis in the animal of the boviné species of cow and tuberculosis in man are closely associated. That is why we receive these requests from public health officials demanding that all cattle supplying milk be tested and proved to be free from tuberculosis.

I want to say this much: Tuberculin, the substance used to test cattle with, is a sterile product. It contains no bacteria and absolutely can not harm healthy cattle. Without tuberculin the reduction of tuberculosis would be a hopeless task.

I also want to say this: The tuberculin test is not 100% perfect, it is not absolute proof, but it is the best science has been able to give us. It is the most accurate of all biological products known to science in the way of testing disease.

The man who depends upon tuberculin alone to reduce tuberculosis in cattle is lost, because he will find some animals that will not respond to this test.

Any animal that has tuberculosis will have a certain amount of this natural tuberculin formed in its system from it and, under ordinary conditions, the system will throw it off. If an animal is extensively infected and the amount produced is large, when we inject a very small amount, about three drops, to determine whether the animal has tuberculosis, we have so much natural tuberculin there that the amount is offset. Especially do we find that in the dairy sections where infections are extensive and our inspections take cattle on general principles, that is, on physical examination.

With the co-operation of herd owners, we are sometimes given information on which we can act intelligently in making these tests.

I want to cite an incident. There was a herd up in the dairy district of Northern Illinois, consisting of 110 cattle, nearly all pure-bred.

The first time we tested we took eight or nine. Within sixty days we took nine more. Among those that were left, we got several reactors and every time we tested there were four or five reactors. It was apparent that there was something wrong here.

We asked the owner whether there was any particular cow that he would suspect of being infected. We pointed out one as a possibility, but he declared this one to be his grand champion cow, the best one he had. She had already

had five tuberculin tests, so I suggested that he draw milk from the four quarters. He did so and we took it to the laboratory and injected it in guinea pigs. And we found that that cow was giving off tuberculosis bacilli in the milk supply. Naturally, we condemned the cow. The next six months we had another reactor, a cow that had stood right alongside of her. I just want to note these instances to impress on your mind that you can't play with fire.

Another man built up a herd and supplied a certain city with milk from tested cows. His demand for this milk became so great that he forgot the importance of feeding the calves and bought neighbors' milk and fed it to the calves. We got his whole calf crop three weeks ago. As you can add cows and protect your herds, do it.

Without the co-operation of the herd owner and he realizing the importance of living up to a certain standard, he can't expect to get by.

"What about compulsory testing?" is a question often asked of us. I am not a bit in favor it for this reason: You can't walk up to a man and tell him you are going to test his cattle. They are his cattle, his money involved and, if I could not get that man's co-operation, I would rather not test his cattle, because without his co-operation you would not get anywhere.

Where a large per cent of the herds in a county have been tested, we should have a regulation giving the State Department authority to let such a man who refuses to test do one of two things: either submit his herd for test or be placed under close quarantine. It would work better than to go out and say: "You have got to test."

We do not find much opposition against the tuberculin test, because people look at it in a different manner. We know that the public gets nearly everything they want. Here you are in a great industry, the dairy industry, handling a product which is a perfect food in itself. There is not another food that we have which can supply what milk can, and yet, is it not a fact that it is the most abominably handled of all food products?

We do not drink enough of it for this reason; that, as

the people become acquainted with its source,, which in many cases is of questionable origin, they are afraid to drink it.

I want to say this: If the producer can put out a product which the distributor can get beyond and advertise and tell the public just what it is, and that standard can be approved by the State and Federal Departments, it is going to increase consumption one-quarter. The distributors would be very glad to get behind a superior product of that kind, because it would make business for them.

I am not speaking particularly of our milk in the dairy district of Chicago. If the women's clubs of the city of Chicago knew the conditions of herds supplying Chicago with its milk, it would cause a cut in consumption of one-third, although they pasteurize the milk.

Pasteurization is a makeshift at best. There is no excuse for ignoring these causes of tuberculosis among cattle supplying milk to be pasteurized and then fed to ourselves and to our babies.

It is no disgrace to find tuberculosis on a man's farm, but it is poor business policy to harbor it. It is lamentable to realize the large number of men who have taken pains in building up a fine herd of dairy cattle and when they come to the point right now they have not a thing to fall back on.

The amusing feature of men objecting to the tuberculin test is that they are the most critical when buying.

As far as breeds of cattle are concerned, one is no more susceptible than another. Due to management, the ration of reactors we find is higher in certain breeds than others.

I want to say this much for the little Jersey. In Illinois we test a good many Jerseys and they are only about 11¼ per cent reactors. When the Jersey owner gets a reactor, she goes to the block. He realizes what it means. We also have another dairy breed and they run 18% reactors. This is no reflection on the cattle, but is due to the way some men handle their herds. The beef herds are not exempt.

We can hardly appreciate the amount of tuberculosis present in the human family in a badly infected district.

This is the people's property. Are we going to tolerate conditions of this kind and practically eat out the heart of the industry. No, let us put our shoulder to the wheel and, especially out here in the Southern part of the State, let us look closely, think sharply, act wisely and accept nothing unless we know it is absolutely clean.

We have such cattle in Illinois. We have over nine hundred fully accredited herds from which you can pick.

When you go to buy, be sure you buy from clean sources and establish the industry down here on a basis on which it will stand, so that in the future you will have something to fall back on.

Now if you gentlemen had your dairy industry developed down here and could supply the demand, think what it would mean in dollars and cents. I would like to see this money stay in Illinois, because it belong to you. We are going to supply this demand as our clean cattle increase.

I do not know if I have answered the question in some of you people's minds or not. Tuberculosis is a large subject and it would take some time to cover it.

Along the lines of how this work is conducted: The State and Federal Departments are under the instructions of Congress. Congress requested this one thing: that the Federal Department assume the responsibility for the work and that is why the Federal Department has one man in charge of the work in every state.

This work is done in co-operation with the various State Departments and for the success of the work in Illinois a great deal of the credit is due to the State Department.

There has been absolutely no friction and I know of no state where they have gotten along so beautifully as in Illinois. The administration has been very friendly toward this work.

When this work became so great, the counties wanted to take it over, because they realized that it would have to go down on a smaller basis. Sixty-three counties of Illinois have made appropriations to pay the operating expenses of the work.

A man is selected in each county and tests conducted

by our regular men are sanctioned and indemnity is paid on reactors found, providing they have been the property of the owner for six months before. In no case will the government pay an indemnity of over \$50 on a pure-bred and \$25 on a grade. The number of cows does not matter.

While I know that in some of these Southern counties your cow population is limited, I would suggest that two counties get together and take over this work. Some northern counties are using two men.

Have that commission from the State Department and have authority under the State Department to test cattle for interstate shipment.

Question: How would we go about having our herd tested?

Dr. Lintner: Get about ten or twenty of you together and I will send a man to take care of you. We have got to cut down the cost of testing. In the last year the cost of testing has been cut from eighty cents to twenty-nine cents a head by grouping our work.

You write me a letter. I am sending a man down to Harrisburg and in the course of two weeks, if you can get this thing lined up, I will send a man to take care of you.

I am going to conclude. I am your humble servant. I want you to know that we are out here trying to serve your interests. If there is anything not right at any time or any information that you want, you write me and I will only be too glad to do it.

I want to thank you for your kind attention. We all profit by the ideas of others and I hope in a meeting of this kind that we can have a better understanding of each other's activities and at the same time put in practice some of the things we have heard. (Applause).

Mr. O'Hair: I do not know how we could hold a convention without Professor Fraser. I venture to say if you fellows will listen and take home what he says to you, it will be worth thousands of dollars to you if you remember it and put it in practice. I will now introduce Professor Fraser.

THURSDAY, JANUARY 22, 10 A. M.

ECONOMICAL MILK PRODUCTION

Chas. Foss.

Ladies and Gentlemen: Anyone engaged in milking cows on a commercial scale does so with the intention of making money at the dairy business. No one wants to keep cows at a loss or for pleasure. It is true, however, that not every one engaged in dairying is making money at it.

There are two ways in which the farmer can market the crops he grows on his farm. One way is to sell them for cash and the other way is to feed them to livestock. To the man who is engaged in dairying, the cow is the market to which he sells his crops.

The price he will receive for the crops he grows on his farm will depend on the price he will receive for his milk or butter fat and upon the ability of the cow to convert the feed he grows on his farm into milk and butter fat economically. The efficient cow is an important factor in economical milk production. There are two ways to increase the profits in the dairy business. One is to get an increased production. Generally speaking, dairymen do not control the price they get for their milk and butter fat, but they can control the cost of production so far as feed and care and efficiency of the dairy cow is concerned.

The Department of Dairy Husbandry of the University of Illinois has found from data secured from cost accounting records kept on farms in the Chicago milk district that 44 pounds of grain, 188 pounds of silage, 50 pounds of hay, 39 pounds of bedding and 2.42 hours man labor enter in the average cost of producing 100 pounds of milk. The cost accounting records from which this data was secured represented approximately 1,000 cows and is the average cost of producing 100 pounds of milk by these cows. If this was

the average cost of producing 100 pounds, there were approximately 500 cows, or one-half of them, that produced 100 pounds of milk for less feed than the average and about 500 cows that required more than this average to produce 100 pounds of milk. If a dairyman, by weighing the milk from each individual cow, would sell all the low-producing cows in the herd and keep only the best cows, he could reduce the cost of producing milk materially and thereby increase the profits. Generally speaking, the cow that will produce the largest flow of milk in a year will return the largest returns above the cost of feed.

In one particular cow testing association, the best cows in the association returned seven times as much net profits in a year as did the poorest cows in the association. In another association, the best herd of ten cows returned \$1,475.20 above the cost of the feed they consumed, while the poorest two herds in the association, comprising 36 cows, only returned \$1,213.95 above feed cost. In this association, the ten best cows returned \$265.25 more net profits than did the 36 poorest cows. The average production of the 36 poorest cows in this particular cow testing association is over fifty per cent higher than the average production of all the cows in the State.

The average of all cow testing associations will show practically the same degree of difference in the production of the best and the poorest cows.

There are two essentials that are necessary for economical milk production. The first one is good cows and the second one is the care that they need to produce milk. There is only one way by which you can determine the good cow from the poor one in a herd and that is by weighing the milk and testing it for its butter fat contents, by which the average production can be determined for the year and the poor cows eliminated from the herd.

The testing can be done either by the dairyman himself or he can join a cow testing association, if there is one in his county, and have a tester do the testing. Where the testing is done by the dairyman, it does not necessarily require much time.

Milk scales should be procured which are so arranged that when the pail of milk is hung upon the scales it will record the net weight of the milk in pounds and tenths of pounds. A lead pencil and milk sheet should be placed at a convenient place and the pounds and tenth pounds recorded on the scales placed on the milk sheet. After the weight of the milk has been recorded on the milk sheet, the milk in the pail is thoroughly stirred and a small sample taken to be tested. The milk should be weighed and a sample taken of each milking for the two milkings in one day. The pounds of milk and butter fat produced by each cow should be multiplied by the number of days in that particular month.

The milk must be weighed one day in each month and at the end of the year you have an approximate record of the production of each cow in the herd.

Each cow in the herd should have a name or number. The testing can be done by any ordinary dairyman provided he has a Babcock tester, or, usually his buttermaker or creameryman will do the testing for him. Wherever it can be done, it is better to join a cow testing association and have the testing done by a tester who runs the association.

If you are a member of a cow testing association, you will not only have the average milk and butter fat production of each cow, but you will also have the amount of feed consumed by each cow in a year, as well as the returns above feed cost. These records will show whether a cow is making a profit or losing money for you.

It is not only essential to have good cows to make a profit, but it is just as necessary to feed the good cow the right kind of feed and all she will consume at a profit.

About 50 or 60 per cent of the feed the cow eats goes for body maintenance and energy used in milk production. Whatever a cow consumes over this amount goes for milk production. If she is fed only enough to furnish what is required for maintenance and energy, she can produce very little milk.

When cows are on good pasture during the month of June, conditions are ideal for economical milk production.

Grass is the natural food for the cow. It not only contains all the necessary nutriment the cow needs for maintenance and milk production, but it also furnishes succulence, without which no cow can produce very much milk.

Another important factor in milk production is contentment and comfort of the cow. To secure the largest production, it is necessary to provide the ideal conditions, which the cow enjoys when on good pasture during the month of June, the year around as nearly as we can.

Succulence for the ration can be supplied either in silage or roots. The barn during the winter must be comfortable. It must have plenty of sunlight, fresh air and must be neither too hot or too cold.

The feed the cow gets must have the required nutrients in the right proportions. It must have bulk, be digestible and palatable, so that the cow will consume a large amount of food.

It is just as necessary that a cow drink a large amount of water in a day as it is that she consume a large amount of feed if she is to produce economically. Eighty-seven per cent of milk is water. A cow that produces a large amount of milk necessarily must drink a large amount of water. Limit the water supply and the cow will drop in milk production in the same proportion.

During the summer months it is not difficult to get the cow to drink all the water she needs. All that is necessary is to give her free access to clean water. It is during cold weather, when she is compelled to drink out of a tank that is frozen with ice, that she refuses to drink all she needs. The water for the cow should be warmed to about 50 degrees F. during cold weather.

The cow should be milked quietly and quickly. A cow is largely a creature of habit. If usually fed at the time of her milking, she cannot be milked satisfactorily until she has her feed.

Special care should be taken to get all of the strippings. The first milk drawn may contain as little as one per cent of fat, while the last drawn may run from six to ten per cent.

Under ordinary conditions, the usual practice of milking twice daily is sufficient. The intervals should be as nearly equal as possible. By milking cows that are heavy producers three times a day, the yield can be materially increased depending upon the amount of milk they produce. Three times milking will increase the production about ten per cent for cows giving from forty to fifty pounds of milk; while, for those giving sixty pounds, the increase is about twenty per cent. Ordinarily, the increase in production of the average cow by milking three times is not sufficient to pay for the extra time and labor required to do the extra milking.



BUILDING UP AN EFFICIENT DAIRY HERD

One of the essentials to economical milk production and profits in the dairy business is good cows, the kind that can convert the feed we grow on our farms into milk and butter fat at a profit. Naturally, the question arises: Where can we get good cows?

There are two ways of procuring good cows. One way is to go out and buy them from dairymen and breeders who have been in the breeding game for a long time, and the other is to raise them. While the first method is the quickest way to get an efficient herd of dairy cows, it is not the cheapest way. It is also true that when you depend on buying your cows, there is more danger of getting contagious abortion and tuberculosis into your herd. It is also true that most good dairymen and breeders know which are their best cows and it is usually the rule that they sell the poorest cows in the herd. Although some of the best cows in a herd can be bought, you will be required to pay a premium to get them. Then, if every one would want to buy good cows, the demand would outstrip the supply and there would not be enough to go around.

The best way to get an efficient herd is to raise your cows. Keep a record of the production of each cow and then raise the heifer calves from the best cows. After these heifers come fresh, sell off the lowest producers.

Where this method of improving a herd is followed, a very efficient herd can be built up in a few years. I have followed this method of improvement for nearly twenty-one years. Some of the cows raised in this way have averaged nearly 3,000 pounds of milk, more than their dams have produced.

The herd from which we built our herd averaged only 3,500 pounds of milk and 190 pounds of butter fat. In three years time, the average production of the herd was increased to 8,000 pounds of milk and 307 pounds of butter fat.

In building up a good dairy herd, the first essential is

to decide upon which one of the dairy breeds you want to keep, and then put a sire of exceptionally good breeding at the head of the herd. This is very important, since the sire is more than one-half of the herd. Whatever improvement is made in milk and butter fat production of the daughters over their dams must come from the sire. Improvement cannot come from any other source except from the sire.

In selecting a sire, attention should be given not only to the individuality of the bull, but his dams should have very good milk and butter fat records for four or five generations back of him, if you expect to make very much improvement in the herd.

There are five leading dairy breeds and they are all good. If a record of production of each individual cow is kept and only the best cows retained in the herd, it will make very little difference which breed you have.

Some of the factors to be taken into consideration in deciding upon which particular dairy breed you want are:

1. Breed of cattle most common in the community.
2. Form in which product is to be marketed.
3. Average production of milk and fat.
4. Original cost and probable demand for surplus stock.
5. Preference of the breeder.

It is generally always better to have a breed of dairy cows which are common in your community, because any surplus stock you may have for sale can be disposed of to much better advantage than would be the case if the breed you have were not common in your community.

Another advantage is that when you once have had a good sire and can no longer use him, you can dispose of him to your neighbor. In many cases neighbors can exchange sires or, where the herd is too small to have a good sire, two or three neighbors can club together and purchase a much better sire than one with a small herd can afford to buy.

If one is selling butter fat only and the skim milk is fed to young stock, it will not make very much difference which one of the dairy breeds you have. Generally speaking,

Guernseys or Jerseys are a little more economical producers of butter fat than the other breeds. In part this is, however, offset by the fact that the other breeds will produce more skim milk, which is a very valuable feed for growing stock.

Wherever whole milk is sold, either to cheese factories, condenseries or for city milk trade, the Holstein cow predominates on account of the large flow of milk she produces. While Holstein milk tests are lowest in butter fat of all dairy breeds, the Holstein cow will produce enough milk in a year to equal any, in many cases, exceed the butter fat production of the other breeds.

It costs more to produce 100 pounds of high-testing milk than it does to produce 100 pounds of low-testing milk and, until the consuming public will be educated to be willing to pay for this difference in production cost, the Holstein cow will predominate where whole milk is sold for city consumption.

So far the average yearly production of butter fat is concerned, the difference is not so great between the different breeds. Of the average of all the official records of each breed up to several years ago, the Holstein led in both milk and butter fat production, averaging 14,974 pounds of milk and 505 pounds of butter fat with an average test of 3.42 per cent fat.

The Guernsey breed averaged 9,030 pounds of milk and 453 pounds of fat with an average of a little over five per cent.

The Jersey breed averaged 7,931 pounds of milk and 424 pounds of butter fat, with an average of 5.35 per cent fat.

The Brown Swiss averaged 10,931 pounds of milk and 437 pounds of fat with an average of about four per cent fat.

The Ayrshire breed averaged 9,621 pounds of milk and 381 pounds of fat with an average of nearly four per cent fat.

To successfully raise a good dairy calf, it is essential to keep the calf growing from the time it is born until it becomes a mature cow.

FEED AND CARE OF THE DAIRY CALF

Allow the new born calf to be with its mother for the first four days, or until the mother's milk has become normal. After the fourth day, remove the calf from its mother, giving it a clean, dry and well-lighted box stall. Feed the calf six pounds of the mother's milk, both morning and evening, in a clean pail. The temperature of the milk must be now lower than ninety degrees Fahrenheit. Feed this ration until the calf is a month old.

On farms where skim milk is available, the whole milk can gradually be changed to skim milk after the calf is a month old. On farms where whole milk is sold and no skim milk is available, the whole milk can be gradually substituted with commercial calf meals that are sold on the market, or a home mixed milk supplement may be fed, consisting of equal parts of oil meal, blood meal, hominy and flour. Make a gruel of this mixture, feeding about one-fourth pound of the dry meal daily at the beginning, the amount being increased one-fourth of a pound daily each week for four weeks.

As a rule, the use of milk should be continued until the calf is sixty days old.

Calf meals alone, or calf meals, hay and grain, do not form a complete ration for the young calf, since they do not supply the necessary nutrients in a form readily digested and assimilated.

To produce satisfactory growth when fed a calf meal, it is best to use the meal as a supplement to milk rather than a complete substitute for it. It is doubtful if, under average conditions, good gains will be made unless some milk is fed until the calf is about sixty days old.

When the calf is about four weeks old, it will begin to nibble at hay and grain. A good quality of clover or alfalfa hay should be placed in easy reach of the calf at this age.

As soon as the calf begins to eat grain, it should have free access to the following mixture:

30 pounds ground corn or hominy.

30 pounds ground oats.

30 pounds wheat bran.

10 pounds oil meal.

Corn silage can be fed as soon as the calf will eat it. Silage will not be consumed to any great extent until the calf is two months old. It is important that the silage is of a good quality.

The calf must also have free access to clean water after it is a few weeks old. This is very necessary, since water is just as essential an element entering into the feed of the calf as any other feed.

In order that the heifer calf will develop into a good cow, it must be kept growing from birth to maturity.

The age at which a heifer should be bred will vary somewhat in different breeds. The smaller breeds can be bred a little younger than the larger breeds. The state of development must also be taken into consideration.

Heifers that have been slow in developing should not be bred as soon as those that have developed more rapidly. Normally developed animals should be bred at the following ages:

Holsteins—19 to 21 months.

Ayrshires—18 to 20 months.

Guernseys—17 to 19 months.

Jerseys—15 to 17 months.

VALUE OF A GOOD SIRE

The question of getting for immediate use a herd that may be kept at a profit is a question of the selection of the individual cow.

It is generally conceded that, taking all dairy cattle into account, about one-third of those raised are unsatisfactory and have to be culled out as unprofitable where records are kept. This results in an enormous loss of feed in the aggregate, not only in raising unprofitable animals, but in keeping them until their worthlessness is proven.

In this connection, one of the first questions to arise is whether these inferior animals which must be culled are the result of inheritance or of environment. In other words, is a good or an inferior cow born what she is, or is she made by feed and management when young. The result of ex-

periments of our Experiment Stations along this line lead to the conclusion that the ability of the cow to produce milk—the dairy temperament, as it is sometimes called, is almost entirely a matter of inheritance.

The high class or the inferior cow are born that way. In fact, within the limits of ordinary practice, the manner of feeding and management of the growing heifer has little, if any, relation to the efficiency of the mature cow as a milk producer. In other words, if a heifer that is well bred does not receive the proper and the right amount of feed needed for proper development, she will be slow in maturing, but after she is fully matured she will have the capacity to produce milk as efficiently as she would if she had been fed to mature more rapidly. On the other hand, a heifer born of low producing parents cannot be made to produce a large flow of milk, no matter how well she has been fed or how rapidly she has matured.

If the difference between a cow having a capacity of 10,000 pounds of milk in a year and another that will produce only 3,000 pounds is a question of parents, it certainly becomes a matter of no small importance to see that the proper parents are provided.

We must depend on the selection of good cows to insure a satisfactory herd and the problem of getting a better herd for the future is a question of having good young stock coming on and is a matter of breeding.

The selection of breeding is primarily that of the selection of the right sire, because it has been a long recognized fact that the sire is half the herd, since practically all the improvement must come from the sire.

One of the most striking demonstrations regarding the value of a good bull as a means of improving the productive capacity of a dairy herd is shown by results obtained at the Iowa Experiment Station. A group of typical native cows was brought from an isolated locality in the Ozark regions in Arizona. After reaching the experiment station, these cows received the same treatment as that given the regular dairy herd. The cows were divided into three groups for breeding purposes. The original cows were placed in group

one, their descendants were bred to Holstein bulls, another group to Guernseys and the third to Jerseys.

Of the thirteen original cows, with a total of 74 lactation periods, averaging 3,991 pounds of milk and 187 pounds of fat, thirteen daughters of these cows by pure-bred bulls, representing the three breeds for a total of 40 lactation periods, averaged 5,556 pounds of milk and 253 pounds of fat, an increase of milk of 39 per cent.

Five cows of the second generation of grades, carrying 75 per cent of improved blood, including a total of six lactation periods, averaged 8,401 pounds of milk and 358 pounds of fat, an increase of 130 per cent in milk yield and 109 per cent in fat production. The improved blood resulted in a decided increase in persistency of milk flow.

A member in one of the Illinois cow testing associations increased the average production of the herd from 5,760 pounds of milk and 193 pounds of butter fat to 11,195 pounds of milk and 377 pounds of butter fat in eight years. This improvement was made possible by the use of well-bred bulls and by keeping a record of production of each cow in the herd and then eliminating the low-producing cows and raising the heifer calves from the best cows.

The value of a good bull to increase the profits in a herd during the lifetime of his daughters is not given the consideration it should receive. The fact is that most farmers give this question very little consideration. If this question would receive the consideration it deserves, the practice of using scrub bulls would soon go out of existence.

A good illustration in the use of a good pure-bred bull to grade up a herd of low-producing cows is in the record of the Sub-Station Herd of Minnesota. In 1905 a group of cows of native and mixed blood was purchased as a foundation for a herd. The purpose was to demonstrate the possibility, and the methods, of building up a grade herd under practical farm conditions.

Complete milk and fat records were kept from the beginning. The average production of the original herd was 196 pounds of fat and 4,666 pounds of milk per cow. Only pure-bred bulls were used in this herd. Thirteen years

later the herd averaged 7,184 pounds of milk and 358 pounds of fat, an increase of 2,518 pounds of milk and 162 pounds of fat.

Assuming these cows were milked six years each, the total increase in production per cow for those having the improved blood would be 15,108 pounds of milk and 972 pounds of fat over the average of the original herd. At \$2.50 per hundred pounds, the additional milk would be worth \$377.70. If the 972 pounds of fat were sold at 45 cents a pound, the increased income would be \$437.40. The additional feed that these improved cows consumed was \$95.00 a cow, leaving a net gain of \$272.70 if the milk were sold at \$2.50 per hundred pounds, or \$342.40 if the fat was sold at 45 cents a pound.

The use of pure-bred bulls in this herd made possible an annual income of \$57.06 per cow for each cow in the herd more than would have been realized from the original stock.

The improvement in this herd has been duplicated wherever a real effort has been made to grade up a herd by the use of good pure-bred sires, both by our Experiment Station and on practical dairy farms.

The first essential in grading up a herd is to decide which one of the dairy breeds is best suited for the kind of a market we have for our dairy products and then stick to this particular breed. Changing from one breed to another will never get us anywhere.

While it is true that in selecting a sire some consideration should be given to type and appearance, it is of more importance to carefully consider the milk and fat records of his ancestors. This is especially true of the dam of the bull we expect to buy.

A sire that has had high-producing ancestors for four or five generations back of him is most likely to make the largest improvement in the production of his daughters over their dams and will increase the net profits in the business.

The surest way to get a sire that will increase the production of his daughters over their dams is to buy a proven

sire; one who is old enough to have daughters in milk and who are good producers. Many of our best sires in all the dairy breeds were sold over the block before their value as a breeder was known.

The bull calf designed for breeding purposes should be well fed during the growing period, in order that he may develop to the full limits of his inheritance. If he is poorly fed during the growing period, he may fail to reach his full size. His offspring may be smaller on account of the sire being undersized.

Until he is five months old he can be with heifer calves and receive the usual ration of the calves in the herd. He should receive skim milk until he is six months old and a liberal allowance of grain composed of a mixture of 30 pounds of barley, 30 pounds ground oats, 30 pounds wheat bran and 10 pounds oil meal. He should have free access to good legume hay.

At six months the skim milk can be discontinued or, if more skim milk is available, it can be fed at a profit until the calf is a year old. After six months old, he should be separated from the other calves and placed in clean quarters where he can get sunlight and exercise. At the age of 12 to 15 months, he can be used for light service.

The sire should never be allowed to run with the herd. He should be broke to lead and should always be handled with a staff.

All good dairy animals have a highly developed nervous system which has the tendency to make the bulls cross. The practice of letting the sire run with the herd is dangerous on this account.

It is a common occurrence that people get hurt or killed by a cross bull. To be on the safe side, the bull must always be handled as a dangerous animal.



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THURSDAY, JANUARY 22, 1:30 P. M.

Mr. O'Hair: We have with us again this afternoon a gentleman who is known over the State of Illinois as an authority on dairying—Professor Caldwell. I want to thank him for what he has done for the dairy business in the State of Illinois. I expect his talk to be very interesting.

FEEDING MINERALS TO DAIRY COWS

R. E. Caldwell.

Mr. Chairman, Ladies and Gentlemen: A little while ago your chairman asked me if I had been out of town trying to get a speech, but such was not the case. Mr. Stanard requested that I go to Marion and talk before the Rotary Club. That gave me a good opportunity of telling the other side of this thing to another type of men, the so-called business men, and I told them as firmly as I knew how what problems the dairy farmer was up against and pleaded with them for full appreciation of your efforts.

I believe one of the biggest problems is to overcome dissension and class hatred; for you to feel that the town man is against you. What we need to do is to have an understanding and appreciation of each other's position. When we do that, dairy products will be appreciated and used more extensively.

The subject assigned me is "Minerals and Mineral Feeding." One of the big problems of feeding is that of mineral feeding. However, to understand and to properly correlate the position that minerals occupy in the ration for dairy cattle, you must understand the problem of feeding.

To feed a dairy cow, as has been told you before in this meeting, you must first of all select a very good cow, be-

cause there is no use of feeding good high-priced feeds to an inefficient machine. Naturally, the thing to do is to feed your cow as nearly as you can from products grown on the farm. Anyone going into the dairy business extensively and who subordinates the farm to the dairy business is making a mistake. Primarily, the farm is the center of activities. The dairy herd should be subordinated to the farm and conducted in such a way as to approach as nearly as possible the providing of feed for your dairy herd.

The growing legumes is one of your first problems. The second thing is to grow some sort of succulence, such as silage. In the matter of grain rations, your carbohydrates, such as corn, barley or oats and feed of that character, and some protein feed, such as soya bean. You will have to purchase a little material to build up your ration.

We have cows that will produce abnormal quantities, as high as twenty, thirty and thirty-five thousand pounds of milk per year, but it is highly artificial and we have produced an abnormal animal from the standard of feeding.

The dairy cow as she existed in her natural state ran wild and browsed over a large area, but methods of domestication, breeding, good care, etc., built her up into an artificial animal.

The dairy cow in her wild state consumed considerable roughage, rather high in mineral matter.

Under the artificial conditions under which we are handling cattle, you find an outcropping of the improper nutrition of cattle in many ways. You may find your cows around the lot chewing bones, stones, ashes, parts of fences—something abnormal. That usually indicates an insufficient supply of mineral matter.

Another manifestation of it may be the matter of breeding. Your cattle may become non-breeders through the improper feeding of minerals. While minerals in themselves are not cures of abortion, they are certain to be looked upon as a means of prevention.

Cows seemingly in perfect feed will not give as much milk as they should. They will be low in fat content in comparison with what that breed should produce. Appar-

ently, there is something wrong with the herd that tests so low. In our section of the state, we have Holsteins testing as low as three per cent.

As I said, when the cattle grazed over virgin soils, crops were high in minerals, but we have depleted the soil fertility, also in the mineral element, and as a result the average crop on our farms today, unless given extreme care, is not as high in mineral matter as it should be.

The practice of limeing the soil in Southern Illinois is going to make a great correction in the mineral matter of the feed grown on that soil. That feed is most certainly going to yield you larger returns. The crop, after it has yielded a feed for the cow, is going to yield you more than the same quantities grown on again.

I am trying to bring your minds around to the point of why cattle need minerals.

A dairy cow is a most unusual manufacturer. Usually a manufacturer, if he is short one material in the making up of his product may make it up some other way. With a dairy cow, not so. She is a very bright creature. If she makes milk, she is going to make standard milk as nearly as she can. But she may be short of minerals.

Very, very interesting results have been uncovered in late years on the problem of minerals. We have all had before us from time to time speakers discussing various vitamins, their presence in various food products, etc. Vitamine "D" was one of the most recently discovered. The first investigators thought that Vitamine "D" was a peculiarity of certain products which seemed to enable an animal to digest minerals and found particularly in cod liver oil. The University of Wisconsin must be given a very great deal of credit for determining what Vitamine "D" really is.

You take a dairy cow or a child, for instance. Put her in a room such as this, put in a ventilating system, keep the windows down and the blinds up so the sunlight may come in, and feed her every conceivable food—and that child within a very short time, no matter how much exercise, no matter how much food, that child will develop rickets.

Rickets is known as a disease resulting from the inability or impossibility of digesting minerals.

At Madison, as part of their plan, they sent out two women, one going to the wealthy section and the other to the more meagre homes to take blood samples. All told, 100 samples were secured. These were marked and analyzed for phosphate content and it was found that over 50% of children in the so-called richer home had rickets, while among the children in the poorer homes there was less than 10% of them rickety. What is the explanation?

They then took a bunch of baby chicks, put them in a room, fed them well, took every care of them they could. Another lot of chicks was taken, fed and cared for in the same way, but one factor was changed; they were placed outside and, instead of the sunlight coming through windows, the sunlight struck them direct. Those outside seemed to grow splendidly, while the other chicks made no progress at all and it was not very long before the development of rickets was noticed.

Experiments were then conducted with children. The rickety children were exposed to sunlight and the rickets soon disappeared.

Vitamine "D"—what is it? Vitamine "D" is an adequate supply of calcium and phosphate and sunlight. That is all it is.

You may ask me: Why would not the sunlight coming through the windows correct rickets? And the answer is: Because there is a certain ray in the sunlight that is extremely delicate and in passing through ordinary glass windows the glass operates as a filter and it is minus the ultra-violet ray of sunlight which is absolutely necessary for the digestion of minerals.

Why were the richer families more rickety than the poor families? They put their children in sun parlors where they were screened off from the God-given free sunshine which was needed, and, therefore, could not digest the minerals taken into the body. And so, these children's bones were porous, the joints were large and generally below normal.

The other poorer-class people for the most part sent their children out into the open where they received a great deal of direct sunlight, which is the reason they were comparatively free from rickets.

So, in carrying on this experimental work, they wanted to establish decisively the effect of sunlight.

They again resorted to the baby chick, as rickets show up very easy in the baby chick. They took a bunch of hens, put six in a coop and three of these hens had red leg bands and three white. They then duplicated the previous tests, that is, these birds were all sheltered, fed and cared for in identically the same way, with this exception: Each day they took the three hens out of each coop that had the red leg bands on and carried the coop outside for ten minutes.

They had trap nests fixed right along beside these coops and when the birds went in and deposited their eggs, they were trapped so that when the attendant came he marked each egg so as to identify the eggs.

They haven't yet been able to grow a baby chick out of a non-rayed hen. Those chicks produced by the birds given ten minutes of sunlight a day could be put in a basement room and kept absolutely out of the sunlight and no leg weakness would be developed.

Now, they carried this thing a little further. They are now conducting experiments on this subject. They are keeping the hens out of sunlight and producing eggs from that condition; then putting the eggs in an incubator and, while in the process of incubating, giving them a shot of sunlight to see if they can produce a chick of the same vitality as a rayed hen.

Now, I am not giving a poultry lecture. This is just as applicable to the dairy industry.

I was talking to a gentleman yesterday. He is down in this county where certainly they have this beautiful sunlight. He has his cows put in the first of October. He keeps them in the barn until grass and he wonders why he has low yield. It is simply because mineral digestion and reproductions are very closely associated. It is necessary

in caring for a herd of dairy cattle that they be properly mineralized.

It has been found that an animal giving fifteen or twenty pounds of milk or over could not consume from ordinary feed the quantity of minerals given off in their product. The Carnation farmers had a big lot of cows on test. In examination of one of these animals, they found that animal had practically taken all the calcium of its entire skeleton in order that it could produce. As a result, they began feeding them minerals and, within two or three months, these animals were again built up.

Take a bottle of milk—it contains more lime than a saturated solution of water and lime can possibly be made. In other words, milk is a high mineral food and that is one reason why it is such a valuable food for children.

Now, in handling your dairy herds, you can build ever so beautiful a barn, supply ever so fine ventilation, you can put all the windows in you want, but your dairy cows if they are going to produce as they should must have sunlight, not an exposure of a long time, but whenever it is possible. Build a protective yard so that your cows can go out for a short time and you will find they will ward off the disastrous diseases known to the dairyman.

Take contagious abortion. I do not know of anything that ruins a man's prospect in the dairy business more than this malady. I don't want you to understand me that minerals will cure contagious abortion. But minerals will aid you in maintaining a degree of resistance in your herds that will go a long way and to such an extent that some men claim that minerals will actually cure abortion.

I know it is said by many that you can increase the butter fat content of milk by feeding. A cow is either a $3\frac{1}{2}$, 4 or $4\frac{1}{2}$ per cent tester or 5, but if you push her too hard, she will slow up just a little and you will find her test running 3.3 per cent when it should be running 3.6.

I have been watching a number in Lake County running around 2.9 to 3.3 per cent. But put them on a proper mineral diet and you will find how quick they will go up.

All of these things may sound like so much hokum and

hot air, but they are sound scientific facts. You and I used to make a lot of fun of our scientists for some of the theories and ideas advanced. One old practice in particular, that of planting potatoes in the light of the moon, was the cause of much merriment, and was branded as a foolish superstition. But, in the light of recent scientific discoveries, there seems to be something to this after all. It has been established that the ultra-violet rays given off by the moon are of decided benefit to planting potatoes. So let us not be too quick to ridicule.

It certainly is very easy to measure the effect of the ultra-violet ray on live stock and on children, and certainly, if there is one message I want you to take home, it is the effect of minerals on children and the absolute importance of children having direct sunlight. Don't think your children are being properly cared for—make it your duty to see that they are. Without sunlight, a child will become rickety, under-nourished and under-sized.

By seeing that children get the proper amount of minerals, you will build up a strong resistance to these maladies.

Just what minerals should be used and from what sources can you get them? You must use calcium, a high calcium limestone of good source. Don't make this mistake—don't use limestone that contains magnesium, because it prevents the digestion of phosphates. Use a 98 or 99 per cent pure calcium limestone.

For dairy cows, you should use an absolutely sterile bone meal. A bone meal is calcium phosphate. It supplies an additional supply of calcium.

What else should you use? You should use potassium iodine. It prevents the development of what is known as "calf goiter," "lumpy jaw" and diseases of that character. The use of iodine in the mixture of minerals is the work of an expert and I would advise you to be careful in using.

Here is the situation: You have calcium phosphate and iodine, but one of the most difficult problems of dairy feeding is getting the cow to eat it. It is repulsive to them. The first time they will all refuse it. They are absolutely wild in the presence of such a feed as bone meal.

In making a mineral mixture containing bone, you must cover it with something and kill the odor of bone. You can introduce it gradually into your regular grain ration. It takes some pungent, oily, high-flavored meal to kill the odor of bone. The whole mixture should be made palatable by mixing it with your grain. It is quite a problem to mix this up. I would say you would do best not to include iodine at first.

I have gone over this thing hurriedly just to bring out one chief point: on one side is the mineral supply; on the other side is the environment necessary to maintain the animal. Combine them together and you will arrive at a successful destination.

I simply give this to you on the problem of mineral feeding: don't confine your cattle, chickens or any of your sterile animals. Give them twenty or thirty minutes of sunlight every day, so that they can digest minerals.

Maybe from seven to ten pounds of minerals will last a cow a month. Keep minerals before them on pastures and also keep salt at various places where it will be easily accessible, because ordinary salt must always be kept as a source of chloride. That must, of course, be kept all the time and is one of the essential ingredients in a mineral. It is a relatively small used product and, as I have observed, one of the greatest shields you can possibly find for the protection of all classes of animals.

But remember, also, to give your children a chance. Don't feed them oleo.

I thank you very much for your splendid attention. (Applause).

Mr. Foss: I would like to ask Mr. Caldwell a question with reference to limestone as a ration. You made a statement that ground limestone is best to use. Is there any objection to feeding limestone coarser than what you spoke of? Would the cow have any difficulty in digesting this coarser limestone?

Mr. Caldwell: No, I think there would be no objection. It is simply increasing the quantity necessary to use.

I don't think it would be injurious. Here is the point to observe: Be sure you have got calcium limestone.

Question: What about hydrated lime?

Mr. Caldwell: It is a very strong lime. I think it should be made available slower.

Another thing: In buying bone meal, buy a perfectly sterilized bone meal and be sure not to carry infection into your herd through the use of a mineral matter such as raw bone meal.

Mr. O'Hair: Professor made one bad mistake in his talk. He said that it was a mistake to use oleomargarine.

Now, the next speaker needs no introduction. He has been introduced a good number of times since he has been here.

Mr. Van Pelt: Ladies and Gentlemen: You people for the most part have sat here very patiently and we have had a wonderful program and have heard a lot of beneficial things. You have just sat here patiently and I sympathize with you.

It reminds me of a little fellow in our town who went to get his tooth pulled and his two little friends waited outside. The boys heard his yell when the tooth was pulled and bragged about their being able to stand the pain without yelling.

He said: "Well, it didn't hurt me. That is my tooth in my hand."

One little boy said: "What are you going to do with it?"

"I am going to pour syrup on it," he replied, and watch it ache." (Laughter).

So much has been said about the feeding, breeding and management of dairy cattle and I have sat here listening to it all, not daring to miss one word.

I am in a very peculiar position. I am left to say anything I want to say and I do not know of anything that has not been said.

I have tried to analyze this very wonderful program. I have attended meetings all over the country and in Canada and I have never sat through such a very wonderful educational program as this has been. I have tried to analyze it and I think that is a very good trait which every one of us should have, that of analyzing that which takes place, summing it all up, figuring out what we can use and put it into practice. It seems to me the chief thing that has grown out of this meeting is that after all our farmers are factors.

I doubt very much if there is one idea that would mean as much to us by way of achieving success on the farm—by raising ourselves up to the plane of dignity where the farmer belongs—as to just get that idea out of this association that the farmer is a manufacturer.

An illustration of this: It occurred to me when we were talking yesterday to have you compute the cost of one hundred pounds of milk. When the explanation is made that we are thinking only of feed cost, that is alright, but there is much more to the cost of producing one hundred pounds of milk than the feed cost. When we think of hours in terms of money, then, and only then, are we going to reach that plane of accounting for ourselves that the manufacturer necessarily adopted a long time ago; that the merchant was compelled to recognize a long time ago; that is so essential that the banker would not stay in business if he did not recognize it. Such things as taxation, interest, repairs and depreciation are all overhead expenses and legitimate.

I doubt very much if there is a manager of any manufacturing institution or any class of manufacturing industry that is a greater factor in behalf of American civilization than the manager of a farm and perhaps it is because we have not gotten down to this strict accounting system that all other business men have been compelled to adopt. Perhaps that is the reason.

Maybe that is why we say that the growing of sweet clover on our pastures is better than the growing of blue grass, but I just have not time to do it and I have no money to do it with.

I oftentimes wonder if we as farmers, and I am talking to you as one of them, if it is because we have not looked at ourselves as manufacturers that is the reason that, instead of doing these little things that mean so much to us, we have excused ourselves on the plea that we haven't time. I do not know of anyone who ever got very far in attaining success who resorted to excuses instead of going after results.

When you stop to think of it, there is no more important business on the face of the earth than agriculture. Six million farmers in the United States! They represent the greatest manufacturing industry perhaps in the world. Annually we receive from agriculture something like nine or ten billion dollars. That is something which men of the city should know and realize just as much as should the men of the land.

Farmers are very important people. There are not a great many businesses along the city streets that represent as large an investment as the farm and its equipment and live stock represent. There are very few businesses that require the judgment and versatility the farming business does.

If I were to be asked what I believed to be the hole in agriculture, I do not think I would say it was a lack of co-operative marketing. I don't think of anything I would say other than that the farmer in the main never has brought himself to realize that he is just as much a business man as any other business man in the world can be.

Now we fully recognize the fact, every one of us. We know that there is not a bank in this country that could run for a year if they failed to keep books and analyze the results as set forth by the figures. We know also that merchants and manufacturers could not remain in business if they kept no closer check on their operations than the farmer.

I believe we have reached the point in American agriculture when we are going to have just as much competition with each other as bankers or manufacturers or merchants. It has come out that prices of agricultural commodities and

products are set on the basis of efficient production, meaning that the efficient farmer is going to prosper, that the law of the survival of the fittest is in effect on the farm today even as it has been in effect in other lines of industry for so long.

You can remember very well when it was the belief, if you please, that the boy of the family who was thought to be the most intelligent was made into a lawyer or doctor some way, while the boy who, it was believed, could not succeed elsewhere, was sent out to the farm to become a farmer. I doubt if there is any class of business that requires more study and more managerial effort than this business of farming.

I think you know the point I am trying to make. It is simply this: that we must in some way or other come to the realization that making excuses as to why we do not do these little things that are so necessary will not bring success. The only thing that will bring it is results—results that are large, economical and profitable.

All farmers, east, west, north and south, do the big things. I know of no farmer who ever failed to have time to plow his land, plant seeds and cultivate the soil, harvest, etc., but I know thousands of farmers who do not have time, if you please, to lime the soil, to test the seeds, to test their cows and keep track of their efforts in that business-like way which is so necessary in the determining of costs and profits. And that is why it so often occurs to me that these meetings fail to get results, because it is so difficult to do in addition to the big things those little things that mean so much.

The cow testing association has been suggested here and there are very few things more important than that. Why is it we are not all in cow testing associations? It is not because the cost is so great, as it is very easily proved that it brings in dollars while it costs cents. It is just one of those little things we feel we can get along without.

If you will pardon a personal reference, I feel that today I have fed and cared for my cows, that I am getting as much production as though I were at home—that simply

means managerial ability. The same is true of a creamery operator present here; his business is going on just the same. It makes it so easy to manage your cows on the basis of encouraging large, economical and profitable production. It requires just a little of that managerial ability.

Among my acquaintances and friends are a great many manufacturers. I have one friend who told me a little story after returning from a trip to Europe.

Manufacturing cream separators is his business. He told me that he went to Europe for the purpose of studying manufacturing to determine if it might be possible to save five or ten cents in the manufacture of a cream separator that probably sells for \$60 or \$75.

The manager is the most important factor of a business. Sometimes it seems to me that we who are conducting the agriculture of the world, the most important business in the world, and contributing the greatest amount to the wealth and prosperity of this country, have not stopped to think of the great value of our being managers.

So this friend of mine said: "I could not find how we could save any money, but perhaps it was because I was trying to find a way to save on cream separators, but, lo and behold! I found there among these people land that sold for \$1,000 an acre and which rents annually for \$50 an acre making money from cows."

He said: "I made up my mind that I would buy some of those cows and see if I couldn't teach the lesson that would make the land back home worth \$1,000 an acre and make it pay interest."

Since that time he has done wonders in agriculture. He was raised in the city, on the brick pavements, and knew nothing about agriculture, but saw the value of management on the farm.

These farmers over there have the advantage of us because their farms are only about eight or ten acres. I want to tell you that it requires a mighty good manager to manage a quarter section of land properly. I doubt if there are many factories, or business institutions in this part of the State of Illinois that require more skill and more versa-

tility than is required to manage a quarter section of land so that it will bring not only the cost of food production, but the cost of managerial effort, which represents interest, taxes, depreciation, etc.

So we have tried pretty hard to bring into our little farming and dairying and breeding operations this factor of managerial effort.

We believe if farming is worth while and the breeding of animals is worth while, that that business, just as much as any other business, should provide for managerial effort. Managerial effort mainly means the doing of the little things, in addition to the big things that we all do. During favorable years you make a profit, but in unfavorable years you don't, because you are not in position to do the little things that are necessary for success.

We weigh the feed every day that every cow in the barn eats. We don't do that for fun. We do it because we think it pays to do it. We have a sheet called a monthly feed sheet and that feed sheet is studied every night.

I don't think I ever had a man work for me but that he thought it was a foolish thing to weigh the feed and keep an account of it, but we have never had them come back and dispute the advisability of it after trying it out.

I do not know what feed costs you. I expect you raise it cheaper than I can buy it, but never in my experience has feed been cheap enough for me to waste. I have never been wealthy enough to be extravagant with feed.

I never could tell within a pound or two how much feed a cow ought to have and I could not tell that unless I knew how much milk she was giving. If you want to take the scales away from me, I will sell every cow I have got, because I will go broke if I can't weigh the feed and the milk the cow gives.

There is no way of interesting and educating the boy and girl on the farm that is so conducive to their remaining there than just letting them have scales and weigh the cow's feed and the milk she gives.

Remember this: that we are in agriculture, engaged

in competition and the law of the survival of the fittest is in operation.

I live in a state noted for agricultural prosperity and a lot of men are now losing their farms. It is going on all over the United States and I wonder if it is not because we are leaving out one of the most important things—managerial ability.

I think every man who brings his cows up to large production does so with a definite system of management. Each may have a different system, but in the end you will find that that system is absolutely for the one purpose of doing just the little things that the other fellow hasn't time to do.

If I could just leave just a little of that spirit with you this afternoon so that you would install a system whereby, as you grow into the dairy industry, your system develops and every time you add a cow you add to your profits, I would be very glad. Many of us have worked with cows for a good many years. We have finally gotten on to a definite system whereby each cow is followed through in about the same way.

One of the greatest things in all business efforts is patience, persistence and perseverance. Try it out for yourselves and see whether I am right or wrong.

Take that cow in your herd which is next to freshen. After eight weeks of freshening, turn her dry and, just as soon as she is dry, then make a point to feed her the best you expect to feed her throughout the entire year. I think one of the greatest factors responsible for low production is this idea that when the cow is dry she doesn't need any feed or care. If ever a cow needs to be well fed, from the standpoint of making a profit for her owner, it is during the resting period while she is dry and prior to freshening.

The unborn calf gets no nourishment whatever except what she gets out of the blood stream of the mother. That is one good reason why we should feed our cows well while they are dry. The second reason is that the cow during the lactation period preceding has taken all of her feed and has been robbing her body to give milk and butter fat to her master.

If we wish our cows to freshen, strong and vigorous and in fairly good flesh, feed them well—we must feed them well during that period if they are going to freshen strong and give us a strong and vigorous calf. A cow that is not well fed between calves cannot do that.

So we carry the cow carefully through her freshening period for the first forty-eight hours and we watch for milk fever. We are always just a little proud when the cow show symptoms of milk fever, because only good cows get milk fever.

Then, here is a funny thing: After this cow is freshened and ready to go to work, then we begin putting her on dry feed and usually make the mistake of overfeeding. I think a lot of cows go wrong because we overfeed them during the first thirty days after freshening.

I think if a man were to ask me how to get an education in feeding dairy cows, I would tell him to learn how to feed hogs and steers. He would find that he would never get anywhere unless he gave them enough to eat. A cow never made a pound of milk in this world out of anything else except feed which she has eaten.

When we start a cow back on feed, we are just as careful as we can be. We know the cow has stored up a lot of surplus flesh and we attempt to transfer that flesh from the body of the cow to the milk pail. She is given five pounds of grain per day in addition to alfalfa and corn silage—no more. We, like the feeder of beef cattle, know that we must bring the cow on her feed gradually. Say we start her on five pounds a day and increase the amount one-half pound every other day. We have learned that a cow will increase just as much on one-half pound of feed as on one pound or two pounds. We know if we get her up to sixty pounds, it is going to take longer to get her down to ten pounds.

The question is, does weighing the feed pay? I wonder if any of you know within two or three pounds how much grain you are giving your cows. If you are only milking ten cows, a matter of wasting two pounds of grain a day at 2½ cents a pound amounts to \$182.50 a year. After all

it is worth while saving. Sometimes it may mean the difference between profit and loss.

We have cows which, when we start turning them dry, still give thirty pounds of milk per day. It is not so much the amount of feed you save. You are using your raw material and you should use it efficiently in order to get the most out of it.

The main principle of feeding all classes of livestock is to do it gradually. A great many of our cows are handicapped by being put on full feed too quickly. They just don't have the opportunity to do that which they inherently have the ability to do. We just lack that system in our feeding and care which is so necessary to the building up of great production.

Cows will teach wonderful lessons through scales. There is one way that our men are kept on their toes. That is by totaling up the milk that everyone of his cows gave that day and he must inform himself whether she is up .2 or down .2 of a pound. And if down, he must milk her a little harder the next day.

You may think that is scientific, but I want to tell you it is no more than a banker, merchant or manufacturer is doing.

So I would simply say to you that these things are not technical. It is going to be just as necessary for us to do these things on our farms as it is in banks, factories and stores.

All through this meeting, so interesting and instructive in the things we can take home and put into practice, the one great thing that has appealed to me is that these things are valuable providing we have time to do them.

In order to introduce managerial ability into farming, we must go ahead and do just like the manufacturer and every other business man has done. We must put into the selling price of that which we produce an additional cost for the time that is necessary to do the little things so essential for success.

With regard to Professor Caldwell's talk, there is no doubt in our minds but that he has absolutely tried the case

and proven it; he has rendered the verdict. Hens must have ten minutes in the sunshine every day. It is absolutely necessary and essential if we are going to get out of our hens that which they have the inherent ability to do for us. These are very little things and very simple to do; these little things which will actually interest you and have you proving to yourselves that there is a way to really make a business out of agriculture, a business out of farming, a profit out of it, a livelihood and a happy life.

I am just going to suppose that if you are like the folks in my state and every other section of Illinois, you are going home and think this over and are going to come to the conclusion that this system is alright, that weighing feed and weighing milk will put your business on an efficient and more profitable basis. It just means adding these things that have brought prosperity to other businesses and that it is a legitimate expense.

I just wish that instead of saying you haven't got time, you would take the next cow that freshens, feed her as I have outlined, and if it is not as I say, if it is not profitable, then don't do it. I will guarantee you that you will double your production. There may be a cow here and there so low in her breeding and so inefficient that she will not respond, but that is the exception and not the rule.

All you need to do to double the production of your herd is to feed systematically, keep a comparison of your feed and milk every day, see that every cow gets the amount she should have, give her the comforts you can and protect her from cold and rain. Let your cows in the barn in the summer away from the heat. Feed her just enough and not too much.

It is the easiest thing on earth to feed and care for your cows and double the production and make the most money out of it you can.

I thank you for your very kind attention. (Applause).

Mr. O'Hair: Mr. Van Pelt gave a splendid talk and it will be well worth while to follow his advice. We have a man here that I am going to ask to say a word to you—Senator Wilson.

Mr. Wilson: I had not thought about saying anything, because I know really very little about the dairy business, but I am talking to some people who do know about it and I find them very enthusiastic.

I have enjoyed these talks this afternoon and I want to say something about a question I received in the mail the other day concerning something we have always made fun of, planting potatoes in the light of the moon. Since I have heard that explained here, I am going to answer that question and say that I think it is alright to plant potatoes in the light of the moon, because it has been proven to be practical and of benefit.

I think dairying in Southern Illinois has a wonderful future. At the last session of the Illinois Legislature, through the efforts and direction of Stanard, I was the means of getting a bill through the Legislature that has helped you or will help you in the future. It is a strike at oleo and prohibits the publishing of anything that would give a tinge of milk to things that are not milk.

That is one thing I have done for this State that will help you, and I assure that, whenever there is anything else that will help you, you may depend upon me to do what I can.

Mr. O'Hair: We are just coming to the end of a very successful convention. I have enjoyed every minute of it.

You have heard a great deal and have been told to think about it. If you don't follow the advice you have received and put these things into practice, don't kick about conditions.

Now, I am glad that we had a good convention, and I am sorry to leave Carbondale, because we have had such a wonderful time.

Is there anyone who has any questions to ask about these talks?

RESOLUTIONS.

The Illinois State Dairymen's Association assembled in 51st Annual Convention at Carbondale, Ill., do hereby resolve that, whereas:

(1) Our friend and brother, W. W. Marple, long active with us in this association and most highly esteemed by the entire dairy industry, as well as being loved by all who knew him, has been called from our midst, we deeply feel our loss, but hereby resolve to go forward and do all within our power to make this association a success, as Mr. Marple has done for so many years and as he would have us do.

(2) Whereas, the hospitality of the Illinois State Normal School has made the success of this convention possible, be it resolved that we express to them our gratitude, taking special cognizance of the untiring efforts of Professor Muckelroy.

(3) Whereas, we have enjoyed the hospitality of Carbondale and Jackson County, be it resolved that we express our appreciation to the Jackson County Farm Bureau, the business men of Carbondale and the ladies of the M. E. Church for their hearty co-operation.

(4) Whereas, a most instructive and entertaining program has been rendered, be it hereby resolved that we express our gratitude to the speakers who have made this program a success.

(5) Be it further resolved that we express to Len Small, Governor of Illinois, our sincere appreciation of his co-operation and assistance rendered during the four years of his administration just finished.

(Signed)

S. J. STANARD.

C. C. MINOR.

E. D. WILBUR.

REPORT OF THE NOMINATING COMMITTEE

The nominating committee met and desires to make the following nominations as officers for the Illinois State Dairy-men's Association for the ensuing year:

President—W. S. O'Hair, Paris, Ill.

Vice-President—S. J. Stanard, Springfield, Ill.

Treasurer—Chas. Foss, Freeport, Ill.

Secretary—Geo. Caven, Chicago, Ill.

Directors

Leslie Miles, Lawrenceville, Ill.

T. P. Smith, Danville, Ill.

C. M. Filson, Salem, Ill.

J. P. Phillips, Sesser, Ill.

Respectfully submitted,

R. E. CALDWELL, Chairman.

L. E. HAZLETT,

E. L. WILEY,

Nominating Committee.

FEEDING FOR EGG PRODUCTION

By L. E. Card, Chief in Poultry Husbandry.

For maximum egg production it is necessary not only that the right feeds be selected, but that they be fed in the right way. Even with a ration in which the feeds are in the right proportion, a high egg yield will not be obtained if the ration is not fed in the right quantity and at the right time. The most profitable flocks are almost invariably those whose owners give some attention to the details of proper feeding.

The greater part of the cost of keeping a hen goes on day by day throughout the year, whether she is laying well or poorly or not at all. A five-pound hen requires the equivalent of fifty pounds of corn a year just for maintenance. This much feed she must have for body upkeep before any egg laying can follow. Whatever she eats beyond this amount is available for egg production, but whether it is so used depends on whether conditions are favorable—that is, on whether the hen is by nature a good layer and is provided with comfortable and sanitary quarters. To reduce the daily ration because the hens are not laying well, or to increase the food allowance following an increase in egg production is to miss entirely an important principle of successful feeding. We must feed for future results, not for past performance.

Several Kinds of Feed are Necessary.

To feed nothing but whole grain is one of the common mistakes in poultry feeding. A complete ration for laying hens must contain not only scratch feed, or whole grains, but also ground feeds, animal protein, green feed, mineral feed and water. The omission of any one of these is certain to result in lower production than would otherwise be possible. When hens can be allowed to range, especially dur-

ing the spring and summer months, they obtain a variety of feeds for themselves. During the winter, however, when there is little to be picked up, care must be taken to supply everything needed. If hens are kept in confinement, it is of course necessary to supply a complete ration at all times.

Use Several Grains in the Scratch Feed.

The scratch feed should contain at least two, and preferably three grains. Often these can all be home-grown. Where corn is the common grain, as it is in most parts of Illinois, it should be used freely in the scratch feed. Under normal price conditions it may make up from one-half to two-thirds of the scratch-grain mixture. If more than this is fed the hens may get overfat, and become easily susceptible to the germs of colds, roup, and chicken pox. As a result, egg production will be lowered and the eggs will not hatch well.

Wheat is well liked by fowls and may form a part of every scratch feed. In feeding value it is approximately equal to corn, pound for pound. When it is low in price it may be fed up to one-half of the total grain allowance. When relatively expensive, it may be reduced to a fifth or even less.

If **heavy** oats can be secured, they may be included in the scratch feed, for the oat kernel is an excellent food. It should be remembered, however, that the hull is mostly crude fiber, of which hens can make practically no use. The feeding of light, chaffy oats to poultry would result in a loss rather than a gain.

Rye is not liked by fowls; if used at all it should be fed in very limited amounts.

Other grains that, if available, may be used in a scratch mixture, are barley, kafir corn, and buckwheat.

The following mixture is recommended as a standard scratch feed under normal price conditions:

Scratch Feed.

5 parts by weight of corn.

3 parts by weight of wheat.

2 parts by weight of heavy oats.

Make the Hens Work for All Their Grain.

The more exercise a hen takes, generally speaking, the more eggs she will lay. While some hens are naturally active, others have to be forced to exercise. One of the best ways to make hens exercise is to feed all scratch grain in litter, such as wheat or oat straw, four or five inches deep. Feeding cracked corn rather than the whole grain is another means of insuring exercise, for if the hen has to pick up six or eight pieces of corn to get what amounts to one kernel she must work harder.

Plenty of exercise promotes a good appetite and so induces a sufficiently large food consumption to make high egg production possible.

Feed Mash the Year Around.

If a hen is to lay a large number of eggs, she must have more protein than is supplied in the common mixture of grains grown on the farm. Furthermore, she must have some protein that is of animal origin. These two objects are most easily accomplished, under ordinary conditions, by feeding a dry mash made up of ground grains or mill by-products, **and in addition animal protein in some form.** Ground feeds can be utilized by the hen more quickly than can whole grains, so that liberal mash feeding is an effective means of sustaining a high egg yield.

Supply Animal Protein in Some Form.

Egg production is more dependent upon the amount of animal protein consumed than upon any other feed. The reason is to be found in the fact that without some form of animal protein, the ration will carry an excess of those nutrients from which the yolk of the egg is made, and not enough of the materials necessary for the development of the white. It is essential that there be an abundance of both sorts of food available to the hen. The common sources of animal protein for poultry are skim milk, either sweet or sour, buttermilk, meat scrap, and tankage. Milk is perhaps the best, but unless it can be given the hens to

drink in place of water it will still be necessary to include meat scrap or tankage in the mash. A flock of one hundred hens must drink from three and one-half to four gallons of milk daily in order to get sufficient animal protein from this source alone. As there is likely to be a shortage of milk on every farm at times, it is well to include some meat scrap in the mash even when milk is fed, in order to guard against a drop in egg production due to a shortage of milk. Since the meat scrap adds greatly to the palatability of the mash, this is a further reason for including it even when milk is being fed.

One of the most palatable mash mixtures and one which gives thoroughly satisfactory results in egg production is the following:

Dry Mash.

- 1 part by weight of wheat bran.
- 1 part by weight of flour middlings.
- 1 part by weight of ground corn or corn meal.
- 1 part by weight of ground heavy oats.
- 1 part by weight of meat scrap.

This mash may be made somewhat more palatable by the addition of one part of gluten feed. Since this by-product is not available in all parts of the state, it has not been included in the standard mash formula just given.

Fowls generally prefer grain to mash. As it is important, however, that they consume a large amount of the mash, the latter should be made as palatable as possible and should be kept always before them in an open hopper. By feeding lightly of grain in the morning, a large consumption of mash is also encouraged.

Moist Mash is a Further Stimulant.

Hens appreciate an occasional treat in the form of moist mash and it is probable that the judicious use of a moist, crumbly mash once a day will result in a slightly higher egg yield than can be obtained by a dry-mash sys-

tem. The best practice in the use of moist mash seems to be to moisten the regular dry-mash mixture with skim milk or butter-milk, giving about what the hens will clean up in thirty minutes. Soaked or germinated oats may be included with this feeding at the rate of about three quarts of dry oats per hundred hens. Such a mixture should be given about noon or a little earlier so that it will not interfere with the other regular feedings. Moist mash must be used with care as there is greater danger of overfeeding and a resulting loss of appetite than where only dry mixtures are fed.

Cheaper Feeds May Be Substituted.

The feeds which are to be included in any ration must of course be considered from the standpoint of price and availability. The cheapest ration which will produce a high egg yield is the aim rather than the best ration regardless of price. For example, wheat mixed feed or ground whole wheat may replace bran and middlings in the mash if local prices for these latter are too high. Standard middlings will occasionally be cheaper than the combination of bran and flour middlings and may be substituted for these. Hominy feed may replace corn meal. Tankage or crackling meal may replace meat scrap if the latter is too costly. However, meat scrap is much more readily eaten and it is therefore usually unwise to replace it with tankage unless there is a considerable difference in price. A difference of ten dollars a ton between meat scrap and tankage means a difference of only one to two cents a day in the cost of feeding a flock of one hundred hens. One extra egg daily will pay for this small difference.

Any change in the ration should be made gradually rather than abruptly for the reason that marked changes suddenly made are almost certain to cause a drop in egg production and may cause the birds to molt.

Green Feed Stimulates the Appetite.

Green or succulent feed is greatly relished by poultry of all ages. No ration can be considered complete without it. In early spring and summer the fowls can of course se-

cure for themselves all that is necessary if they are on green range. At other seasons it is frequently worth while to give fresh green feed daily. Some of the feeds that may be used are cut clover or alfalfa, cabbage, mangel beets, and sprouted oats. Mangels of the half-sugar type form a very satisfactory succulent feed for winter use. Cabbage is excellent feed for fall and early winter. Sprouted oats are costly from the labor standpoint, but they are very well liked by hens.

Mangels can be fed easily, and without waste, by cutting them in half and hanging them on nails driven in the wall of the poultry house, about a foot above the floor. Cabbage may be fed whole. Any cut greens, such as clover or alfalfa, must be fed immediately after cutting or the fowls will not eat them readily.

Some Minerals Are Needed.

Grit is a necessary aid to the gizzard in crushing and grinding feed. Fowls ranging over gravelly soil can easily find their own grit. Most Illinois soils contain so little gravel that it is well to supply commercial grit for the poultry flock. Not over three-fourths of a pound of hard grit will be needed by a hen in a year's time, so the cost is small. Soft grits are not so efficient as hard and if used should be furnished in a somewhat larger quantity.

A small part of the lime that goes toward the making of the egg shells is supplied in the grain and meat feeds, but for the larger part of the necessary lime, oyster shell must be provided. Without sufficient lime there will be fewer eggs and they may be soft shelled. In the spring and summer, when the hens are laying heavily, special attention must be given to supply this mineral.

Both grit and oyster shell should be kept constantly available in hoppers. One hundred hens will consume in a year about seventy-five pounds of grit and from two hundred to three hundred pounds of oyster shell if they are always available.

It is a well established fact that all animals require a certain amount of salt. Hens are no exception. There is

one difference, however, in that salt in more than very limited quantities is poisonous to poultry. A safe rule is to use one-half pound of salt to each hundred pounds of dry mash. The salt should be sprinkled over the mash when the latter is being mixed.

Supply Plenty of Water.

The standard weight for a dozen eggs is one and one-half pounds, and of this about one pound is water. In terms of what the hen eats, there is more water than feed in a dozen eggs. This suggests the importance of an abundance of fresh water for hens to drink. A flock will cease laying sooner if kept without water than if kept without food. There must be no limitation of any ingredient necessary to the formation of complete eggs, because hens will lay either fully formed eggs of uniform chemical composition or none at all. One reason why some farm flocks do not lay more eggs is that they are not given sufficient water to drink.

In winter it is well to take the chill from the drinking water so that the hens will drink more freely. In summer, on the other hand, the water supply should be in the shade in order that it may be as cool as possible. The drinking vessels should always be kept scrupulously clean.

Make the Morning Grain Feeding Light.

Hens should not be given all the grain they want in the morning. Enough should be scattered in the litter to keep them busy for some time, but not enough to satisfy their appetites. This will encourage their eating throughout the day from the hoppers of dry mash, which should be kept always before them. Aim to keep the hens hungry to the extent that they are always ready for scratch feed. Should they not appear hungry at any feeding time, reduce the quantity of grain. The hen's appetite rather than any definite schedule should determine the amount to be given.

Vary the Ration with the Season.

During the winter the hens will need a larger proportion of grain because some of it must be used for body heat.

Gradual reduction of the daily grain allowance during the spring and summer encourages the hens to eat more mash, with the result that egg production is kept up during the summer and early fall, when the natural tendency is toward fewer and fewer eggs. When hens stop laying in the fall they eat much less mash than they have been eating, and it is then a good plan to increase the grain allowance gradually so that the hens will keep in good flesh.

For those who desire a plan of feeding to follow while acquiring the experience on which to base their judgment, the following schedule of approximate amounts of scratch grain per hundred hens per days is given. It is assumed that a mash such as previously described will be kept before the hens at all times. If a mash containing no corn meal or ground oats is to be used, the amounts of scratch feed per day should be increased accordingly.

Approximate Quantities of Scratch Feed Daily Per 100 Hens

Month	Morning	Evening
November to February, inclusive	2 to 4 qts.	6 to 8 qts.
March	2 to 3 qts.	6 to 7 qts.
April and May	2 qts.	5 qts.
June	1½ qts.	5 qts.
July	1½ qts.	4½ qts.
August	1 qt.	4 qts.
September and October	1 qt.	3 qts.

The change in amounts will not, of course, come abruptly on the dates indicated, as may be inferred from the schedule, but should be made very gradually. Sudden changes in rations are likely to throw the hens off feed. In the case of a very late-laying flock, the amounts scheduled for October should be continued into November.

Do Not Starve the Broody Hen.

Broodiness seems to be a natural instinct of hens. The wild ancestors of the hen probably hatched but a single brood of chicks a year, and our domestic hens commonly go broody but once if allowed to hatch and rear a brood of

chicks. When incubators are used for hatching, the practice of "breaking up" broody hens must ordinarily be followed.

Broodiness usually follows a short period of intensive egg laying. At the time the hen goes broody her ovary contains a number of well developed yolks nearly ready to be detached and surrounded with albumen and shell. If broodiness is allowed to take its natural course these yolks will be reabsorbed, a process which definitely delays the time when egg laying can again start. The feeding of the broody hen should be planned to prevent this reabsorption. Confining her in a coop without food will only hasten the reabsorption. Instead of this she should be fed liberally on feeds which tend to stimulate egg production. The regular dry mash should be constantly available to her and a moist mash may be fed if desired. Plenty of water should be provided. Milk to drink is still better.

It is well to confine the broody hen for about three days and nights in a slat-bottomed coop where there is no nesting material. In mild weather it is often sufficient to turn the broodies loose for a few days in a grass-covered run, provided dry mash and milk or water are available to them. It is essential that the broody hen be separated from the flock not later than the second night that she indicates a desire to remain on the nest instead of going to roost. There is nothing to be gained, however, by such drastic means as ducking the hen in a pail of water or confining her in a small pen without food or drink.

It may be pointed out that the hen that never lays eggs never goes broody. It is also true that the very best hens do not go broody at all. Egg laying is a prerequisite to broodiness and the broody hen should be given some consideration for what she has done. It must be remembered however, that no hen can go broody more than two or three times during the year and still make a high egg record.

Artificial Light Will Lengthen the Hen's Working Day.

The practice of using some artificial light in the poultry house during the winter months is becoming quite gen-

eral among commercial poultrymen. Many farm flocks could be made somewhat more profitable by this means. The use of artificial illumination to lengthen the hen's working day tends to approximate spring conditions, and makes possible a greater food consumption than would otherwise occur. The mixtures suggested in this circular need not be changed when lights are used, but the method of feeding must be adapted to the method of illumination. Particularly, must the time of feeding be arranged to fit the lighting plan.

If the lights are to be turned on at five o'clock in the morning, grain for the morning feeding may be scattered in the litter after the hens have gone to roost. Fresh water should also be supplied at the same time. In cold weather it is well to put hot water in an insulated drinking fountain so that it will be still slightly warm when the hens get off the roosts in the morning.

An Evening Lunch Means More Eggs.

Perhaps a simpler plan than providing the early morning feed, and one that is almost as effective, is to give the hens an evening lunch at about eight-thirty or nine o'clock. With this plan a light feeding of grain is given at the usual time, perhaps an hour before dark, and then a heavier grain feeding by artificial light. This late feeding is perhaps best given in troughs so that the hens can get it quickly altho it may be fed in litter, if desired. In a very short time the hens will learn to come off the roosts at once when the lights are turned on, eat their grain, and go back to the roosts before the lights are turned off.

Illumination Must Be Used Wisely.

Care should be taken not to overstimulate the hens by the use of artificial lights. A production of more than forty eggs daily from each hundred hens during the winter months may be disastrous in that it may result in a spring molt. Extreme care should also be used when artificially lighting flocks that are to be used for breeding. It is consid-

ered sound practice to let the breeding hens have free range all winter and liberal grain feeding, without artificial lights, while the pullets may be confined and fed under artificial illumination for high winter production.

Careful Methods of Feeding Will Pay.

Success with poultry, as with any other class of live stock, depends nearly as much on the method of feeding as on the particular ration used. The judgment of an experienced feeder is worth infinitely more than any rule or system of feeding. The suggestions in this circular are based upon a comparatively simple feeding plan that has been found to give profitable results at this Station. They will be of the most value to persons who use them critically, supplementing the general plan with ideas and practices gained from their own experience. Every feeding mixture can be improved by the addition of a liberal amount of common sense.

If You Want a Full Egg Basket—

Feed all scratch grain in deep litter, summer and winter. Keep the hens busy.

Keep a good dry mash in open hoppers every day in the year.

Always provide animal protein in some form, either milk to drink or meat scrap or tankage mixed in the mash. Many flocks that are fed grains freely are starved for animal feeds.

Provide succulent feed if the hens are not on green range.

Never use musty or moldy grain.

Change wet litter at once. There is danger in damp, moldy litter.

Begin gradually any changes in the ration or the method of feeding.

Watch the appetites of the fowls so that you will know how much to feed them.

Give light feedings of scratch grain in the morning to encourage mash consumption.



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OF
CIVILIZATION

Supply fresh water at least once daily; from the hen's standpoint the oftener the better.

Keep oyster shell and grit where the hens can always get them.

Feed the flock regularly. Hens will soon learn to expect the feeder at a certain time each day.

One writer has summed up good feeding practice by saying, "Feed wholesome food; feed liberally; feed regular; feed a variety. After that, the only secret in feeding is to feed 'activity' into the hen."



EFFECT OF GARLIC ON THE FLAVOR AND ODOR OF MILK

**By C. J. Babcock,
Assistant Market Milk Specialist, Bureau of Dairying,
U. S. Department of Agriculture.**

Object of the Experiment.

When dairy cows are first turned out on pasture in the early spring there is probably no plant which more seriously affects the flavor and odor of milk than garlic, or wild onion. In some sections it renders the milk practically unmarketable. Once the garlic flavor and odor have entered the milk there is no efficient or economical method known of eliminating it. The only practical way to prevent the presence of garlic flavor and odor in milk appears to be by preventing the cows from eating the plant.

In order to obtain more definite information concerning the effect of garlic on the flavor and odor of milk, feeding experiments were conducted by the Bureau of Dairying on its experiment farm at Beltsville, Md. The specific objects of the investigation were: (1) To determine how garlic flavor and odor enter the milk; (2) to determine the length of time required after consumption of garlic for the flavor and odor to enter the milk; (3) to determine the length of time after cows consume garlic before the flavor and odor disappear from the milk.

Details of Experiment.

The investigation was conducted with nine Jersey and seven Holstein cows. The cows were giving milk relatively free from abnormal flavors and odors, and entirely free from garlic flavor and odor when fed the basic hay and grain ration. The average daily milk production of the cows during the investigation was 31.5 pounds, the highest daily average being 44 pounds, the lowest 16 pounds.

The garlic fed was of the variety commonly found growing wild. Only the garlic tops were fed, and at the time of feeding were about 10 or 12 inches high. They were cut into short lengths and mixed with ground feed, in order that the cows would readily consume the garlic.

Samples were taken from the milk of each cow at the time of milking, given a key number and cooled, but not aerated. The samples were judged for flavor and odor by experienced judges, who had no knowledge of the key. An "opinion," as this term is used in this bulletin, denotes the decision of the judge in regard to one sample.

Using the term "garlic" to signify flavors and odors which the judges believed to be due to garlic, the following classification was used: Normal, very slight garlic, slight garlic, and strong garlic. When no garlic flavor or odor was perceptible the sample was rated normal, and when a garlic flavor or odor was perceived the sample was rated according to the degree in which the judge considered garlic to be present.

MILK TESTS

Check Samples.

The check samples were taken from milk produced by cows which were fed no garlic. At the beginning of the investigation some garlic flavor and odor were perceived in these samples. A total of 180 opinions on 26 samples showed only 78.9 per cent rating the milk normal in flavor, and 77.8 per cent normal in odor. Although the larger percentage of the cases of garlic flavor and odor were rated very slight garlic, some were rated slight garlic and strong garlic. (See Table 1, group 1, and fig. 1, A).

Investigation as to the cause of garlic flavor and odor in the check samples showed that at least five of these samples were produced by cows which inhaled some garlic odor as they were standing by the side of cows consuming garlic. The opinions on these five samples showed only 36.8 per cent rating the milk normal in flavor and 34.2 per cent rating the milk normal in odor. Opinions were equally divided between very slight garlic and slight garlic; 23.7 per

cent representing flavor and 26.3 per cent representing odor in each of these groups, whereas 15.8 per cent rated the flavor and 13.2 per cent rated the odor strong garlic. (See Table 1, group 2, and fig. 1, B).

After eliminating the five samples from cows standing by the side of those consuming garlic, the remaining check samples still showed a few cases of garlic flavor and odor which also were probably due to the inhalation of garlic odor. However, 90.2 per cent of the opinions rated these samples normal in flavor and 89.5 per cent normal in odor. Of the opinions designating garlic flavor and odor, 5.6 per cent rated the flavor and 6.3 per cent rated the odor very slight garlic, whereas 4.2 per cent of the opinions rated the samples slight garlic in both flavor and odor. None of the opinions rated a sample as strong garlic in either flavor or odor. (See Table 1, group 3, and fig. 1, C).

Table 1.—Flavor and odor found in check samples of milk.

(Group 1: All check samples taken during experiment. Group 2: Check samples produced by cows standing by the side of cows consuming garlic during milking. Group 3: Check samples produced by cows with which precautions were taken to prevent close proximity to garlic).

Rating	Percentage of Opinions					
	Flavor			Odor		
	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
Normal	78.9	36.8	90.2	77.8	34.2	89.5
Very slight garlic ..	9.5	23.7	5.6	10.5	26.3	6.3
Slight garlic	8.3	23.7	4.2	8.9	26.3	4.2
Strong garlic	3.3	15.8	0	2.8	13.2	0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Time Required for Garlic Flavor and Odor to Enter Milk.

In order to determine the time required for garlic flavor and odor to enter milk, cows were fed one-half pound of garlic, and samples of milk were taken at various intervals after feeding. When the samples were taken one minute after feeding, 31.3 per cent of the opinions rated the milk normal in both flavor or odor. Of the opinions designating garlic, 56.2 per cent rated the milk very slight garlic and 12.5 per cent rated it slightly garlic in both flavor and odor. None of the opinions rated the milk strong garlic in either flavor or odor.

Increasing the time interval between feeding and taking the milk samples from one minute to from three and one-half to five minutes, increased the percentage of opinions designating garlic in the samples. When the samples were taken at this time only 12.5 and 6.3 per cent of the opinions rated the milk normal in flavor and odor, respectively. Of the opinions designating garlic flavor and odor, those rating the samples as strong garlic showed the higher percentage, 43.7 per cent representing flavor and 50 per cent representing odor in this group; whereas 12.5 and 31.3 per cent of the opinions rated the flavor very slight garlic and slight garlic, respectively, and 43.7 per cent rated the odor as slight garlic, none of the opinions rating the odor very slight garlic.

A further increase in the time interval between feeding the garlic and taking the milk samples to from six to seven minutes increased to a marked degree the percentage of opinions designating garlic in the milk. When the samples were taken at this time, 73.3 per cent of the opinions rated the milk strong garlic in flavor, and 73.4 per cent rated it strong garlic in odor, while none of the opinions rated the milk normal in either flavor or odor. Of the opinions on flavor rating the milk very slight garlic and slight garlic, 26.7 per cent rated it very slight garlic, whereas none rated it slight garlic; and 13.3 per cent of the opinions on odor were rated in each of these groups.

Increasing the time interval so that from 10 to 10½ minutes elapsed between feeding garlic and taking the milk samples further increased the intensity of the garlic flavor and odor in the milk. When the samples were taken at this time, 20 and 80 per cent of the opinions rated the milk slight garlic and strong garlic, respectively, in both flavor and odor. None of the opinions rated a sample normal or very slight garlic in either flavor or odor. (See Table 2 and fig. 2).

Table 2—Time required for garlic flavor and odor to enter milk.

(Percentage of opinions detecting garlic in samples of milk produced by cows consuming one-half pound of garlic at various intervals after feeding).

		Flavor—Time interval between feeding and taking milk sample				Odor—Time interval be- tween feeding and taking milk sample			
1 min.	Rating	3 ½ to 5 min.				6 to 7 min.			
1 to 10 ½ min.		1 min.				3 ½ to 5 min.			
6 to 7 min.		10 to 10 ½ min.							
		Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Normal	-----	31.3	12.5	0	0	31.3	6.3	0	0
Very slight garlic	-----	56.2	12.5	26.7	0	56.2	0	13.3	0
Slight garlic	-----	12.5	31.3	0	20.0	12.5	43.7	13.3	20.0
Strong garlic	-----	0	43.7	73.3	80.0	0	50.0	73.4	80.0
Total	-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Time Required After Consumption of Garlic for the Milk to be Free from Garlic Flavor and Odor.

In order to determine how long after dairy cows have consumed garlic the flavor and odor produced by this plant continue to be perceptible in the milk, cows were fed one-half pound of garlic at various intervals before milking.

Feeding this amount of garlic four hours before milking showed that the garlic flavor and odor were still present to a very marked degree, 71.4 per cent of the opinions rating the milk strong garlic in both flavor and odor. The garlic odor was slightly more pronounced than the garlic flavor, 7.2 and 21.4 per cent rating the odor very slight garlic, and slight garlic, respectively, whereas 14.3 per cent of the opinions rated the flavor in each of these groups. None of the opinions rated the milk normal in either flavor or odor.

When the garlic was fed five hours before milking there was a slight decrease in the intensity of the garlic flavor and odor in the milk as compared with feeding four hours before milking. When the garlic was fed at this time 7.1 per cent of the opinions rated the milk normal in both flavor and odor. Of the opinions designating garlic, 28.6 and 64.3 per cent rated the flavor slight garlic and strong garlic, respectively, while 21.5 and 71.4 per cent gave similar ratings to the odor.

Increasing the time between garlic feeding and milking from five to six hours decreased to a marked extent the intensity of the garlic flavor and odor in the milk. When fed at this time 30 per cent of the opinions rated the milk normal in flavor and 32.5 per cent rated it normal in odor. Garlic flavor and odor, however, were still present to a considerable extent, 15 per cent of the opinions rating the flavor and 12.5 per cent rating the odor strong garlic, whereas 25 and 30 per cent rated the flavor very slight garlic and slight garlic, respectively, and 20 and 35 per cent gave similar ratings to the odor.

Increasing the time interval so that seven hours elapsed between garlic feeding and milking, practically eliminated the garlic flavor and odor from the milk. When fed at this time, 91.7 per cent of the opinions rated the milk normal in both flavor and odor. All of the garlic flavors and odors, i. e., 8.3 per cent of the opinions, were rated as very slight garlic. (See Table 3 and fig. 3).

Table 3.—Time required after the consumption of garlic for the milk to be free from garlic flavor and odor.

(Percentage of opinions detecting garlic in samples of milk produced by cows consuming one-half pound of garlic at various intervals before milking).

Rating	Flavor — Time interval between feeding and milking				Odor—Time interval be- tween feeding and milk- ing			
	4 hr.	5 hr.	6 hr.	7 hr.	4 hr.	5 hr.	6 hr.	7 hr.
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Normal	0	7.1	30.0	91.7	0	7.1	32.5	91.7
Very slight garlic.....	14.3	0	25.0	8.3	7.2	0	20.0	8.3
Slight garlic	14.3	28.6	30.0	0	21.4	21.5	35.0	0
Strong garlic	71.4	64.3	15.0	0	71.4	71.4	12.5	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Inhalation of Garlic.

The presence of garlic flavor and odor in the check samples, and the shortness of the time after feeding garlic before the flavor and odor were perceptible in the milk, indicate that it was not necessary for garlic to be taken into the stomach of the cow before entering the blood stream and thence passing to the udder. The only other way that

garlic flavor and odor could enter the milk would be by the odor being inhaled, then absorbed by the blood in the lungs, and so transmitted to the milk. In order to determine whether this actually took place, cows were forced to inhale garlic odor for 10 minutes and were then milked at varying intervals after inhalation. The inhalation took place in such a manner that there was no possible chance for the cows to consume any of the garlic, and outside of the milking barn in order that there should be no chance of a garlic-permeated atmosphere surrounding the milk. Therefore, any garlic flavor or odor perceptible in the milk would of necessity come by absorption from the lungs into the blood stream and thence to the udder.

When the cows were milked two minutes after inhaling garlic for 10 minutes (or 12 minutes after they began to inhale garlic), the garlic flavor and odor were very pronounced in the milk. The larger percentage of opinions—i. e., 87.5 per cent—rated the flavor of the milk strong garlic, whereas 12.5 per cent rated it slightly garlic. There were no opinions rating the flavor either normal or very slight garlic. The garlic odor was even more pronounced than the garlic flavor, 100 per cent of the opinions rating the odor of the milk strong garlic.

Having determined that the garlic flavor and odor enter the milk by inhalation, in order to further determine the length of time after inhalation that the flavor and odor continue perceptible in the milk, the time interval between inhalation and milking was increased to thirty minutes. When the samples were taken at this time, the garlic flavor and odor, although not so intense as after the two-minute interval, were present to a marked degree, 14.3 per cent of the opinions rating the milk normal, and 42.9 per cent rating it strong garlic in both flavor and odor. Opinions were equally divided between very slight garlic and slight garlic, 21.4 per cent being in each of these groups for both flavor and odor.

Increasing the time interval between the inhalation and milking from 30 minutes to 60 minutes, decreased to a considerable degree the intensity of the garlic flavor and

odor in the milk. When the samples were taken at this time, as many opinions rated the milk normal as rated it strong garlic in both flavor and odor, i. e., 35 per cent. Of the opinions rating the milk very slight garlic and slight garlic, 15 per cent rated the flavor in each of these groups, whereas in odor 10 per cent rated it very slight garlic and 20 per cent rated it slight garlic.

When the time interval was further increased so that 90 minutes elapsed between the inhalation of garlic and milking, the greater part of the garlic flavor and odor was eliminated. When the samples were taken at this time 75 per cent of the opinions rated the milk normal in both flavor and odor. Of the opinions rating the milk very slight and slight garlic, 18.8 per cent rated it very slight garlic, whereas only 6.2 per cent rated it slight garlic in both flavor and odor. There were no opinions rating the milk strong garlic in either flavor or odor. (See Table 4 and fig. 4).

Table 4.—Effect of inhalation of garlic upon flavor and odor of milk.

(Percentage of opinions detecting garlic in samples of milk produced by cows inhaling garlic for 10 minutes at various intervals before milking).

Rating	Flavor—Time interval between inhalation and milking				Odor—Time interval be- tween inhalation and milking			
	30 minutes		60 minutes		90 minutes		90 minutes	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Normal	0	14.3	35.0	75.0	0	14.3	35.0	75.0
Very slight garlic	0	21.4	15.0	18.8	0	21.4	10.0	18.8
Slight garlic	12.5	21.4	15.0	6.2	0	21.4	20.0	6.2
Strong garlic	87.5	42.9	35.0	0	100.0	42.9	35.0	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

BLOOD TESTS

In order for flavors and odors to enter the milk through the body of the cow, it is necessary for these flavors and odors to be absorbed by the blood stream and then transmitted to the udder. To determine whether garlic could be detected in the blood, cows were fed two pounds of garlic tops, and blood samples were taken from the jugular vein

16 minutes, 30 minutes, and 45 minutes after feeding. The blood was examined approximately 24 hours after the samples were drawn, coagulation being prevented by the addition of sodium citrate.

The sample drawn 16 minutes after feeding was rated "not perceptible," as the judges failed to identify a garlic odor. The sample drawn 30 minutes after feeding showed the garlic odor to such an extent that the judges readily identified it, while the sample drawn at 45 minutes after feeding gave off a strong odor of garlic.

A comparison of these blood tests with the milk tests shows what appears to be a discrepancy, as it required a greater lapse of time between feeding the garlic and taking the samples for the garlic to be perceived in the blood than in the milk. This may be due to one or more causes. The garlic flavor and odor may have an affinity for fat and, therefore, pass rapidly from the blood to the milk. It may also be that garlic is more easily perceived in milk than in blood.

Conclusions.

Garlic flavor and odor were detected in the milk when the milk samples were taken one minute after feeding garlic.

The intensity of the garlic flavor and odor increased as the time interval between feeding the garlic and taking the milk samples increased, until at 10 minutes a high degree of intensity was reached.

Garlic flavor and odor were present in milk to a very objectionable degree when the cows consumed one-half pound of garlic four hours before milking.

As the time interval between garlic consumption and milking increased, the intensity of the garlic flavor and odor in the milk decreased, and at seven hours had practically disappeared.

Strong garlic flavor and odor were found in milk drawn two minutes after the cows inhaled garlic for 10 minutes.

As the time interval between the inhalation of garlic and milking increased, the intensity of the garlic flavor and

odor in the milk decreased, and they practically disappeared in 90 minutes.

Garlic odor was readily perceived in samples of blood drawn 30 minutes after feeding the cows two pounds of garlic tops, and strong garlic odor was present in the blood drawn 45 minutes after such feeding.



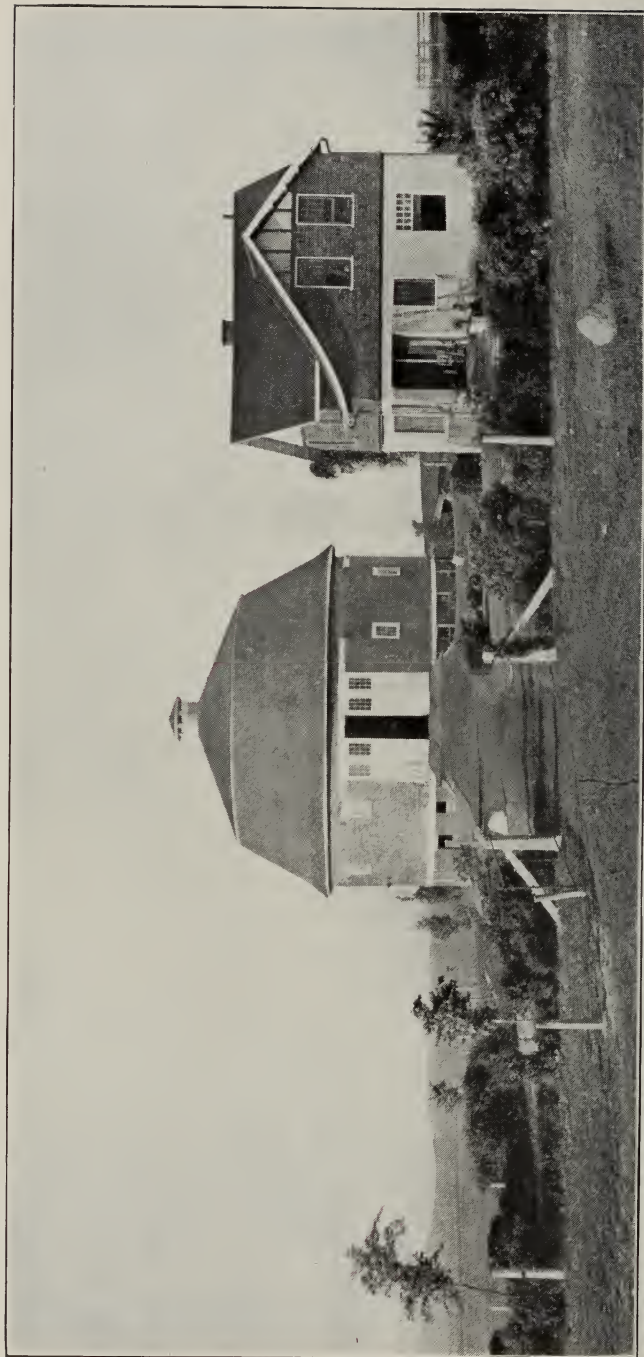
MOST MILK PER ACRE ON FARM FEEDS ALONE

**Wilber J. Fraser, University of Illinois.
In Hoard's Dairyman.**

To determine the maximum amount of milk and butter-fat per acre that can be economically produced when all of the feed for the stock is raised upon the land, a part of the University Dairy Farm was set aside and the demonstration continued for six years. Only twenty acres were available for this purpose.

The conditions that led to the starting of this work were the tremendous waste of human energy on our dairy farms caused by inefficient dairy herds uneconomically fed and improperly cared for, and crops raised that were not suited to produce the maximum amount of proper dairy feed per acre. This was fourteen years ago. Since that time Illinois dairying has progressed a great deal. Silos have multiplied, clover and alfalfa are more commonly grown; and, most striking of all, the cows now generally kept are of higher quality and production. Yet a large share of the same problem remains—how to produce the most milk and fat per acre in the most practical and economical manner.

The fact is that dairying has progressed just to the point where the two big factors, growing the most good dairy feed per acre and the most economical feeding, can be applied in general practice. This milk per acre demonstration carried on for six years at the University sheds the strongest light on this problem, and good practice on many farms has gone far enough to confirm it. Through years of cow testing, dairy teaching, and discussion, multiplied demonstrations at the colleges and better practices on many farms, we have come to a fair understanding that good cows and balanced rations are fundamentally necessary. That much is generally acknowledged and, however much we come short of applying it, that is the goal toward which dairy practice is steadily tending. Now we have to com-



Where a grade herd produced 3,888 pounds fat per acre for six years on feeds grown solely on this area.

plete the economic circle by producing the best kind of feed instead of buying it, and getting the most of it per acre.

On dairy farms where the cows consume the crops, the milk check contains a certain portion of the profits from crops as well as from the cows. The increased pay for the dairyman's labor will depend upon his efficiency in the production of well chosen crops on every tillable acre of the farm each year, and the proper feeding of these to efficient cows that are well cared for. He can and should raise practically all of the feed on the farm, and the kind of crops that bears directly upon the maximum amount of milk and butterfat that can be most economically and permanently obtained from an acre of land. When he sees the plain possibilities of this production he will have little need for commercial feeds.

3,888 Lbs. Milk Per Acre.

The cows averaged, including the time dry, 7,470 lbs. of milk and 262 lbs. of fat per cow per year largely on corn silage and alfalfa hay, and without a dollar's worth of feed from outside the farm. This production was obtained under economical farm conditions. The remarkable results of this test are that a grade herd produced 3,888 lbs. of milk and 136 lbs. of fat per acre per year for six years from feeds grown solely on this area. This is almost three times the amount of milk per acre that was produced on strictly dairy farms in Illinois and, therefore, challenges the attention of practical dairymen.

The details of all this experience for six years; how the crops were chosen and handled; how the cows were fed, housed, and cared for; and their condition and production through all the stages and vicissitudes of this period, are necessary to a full understanding of how far and how well these methods solve the problem in actual farm practice. Each feature of the farm work requires a story to set forth its facts and meaning. This article can give only a bird's-eye view of the test and the results and indicate what a substantial advance and economic saving they bring to practical dairy farming.

Corn and Alfalfa Yield Three Times Other Crops in Feed.

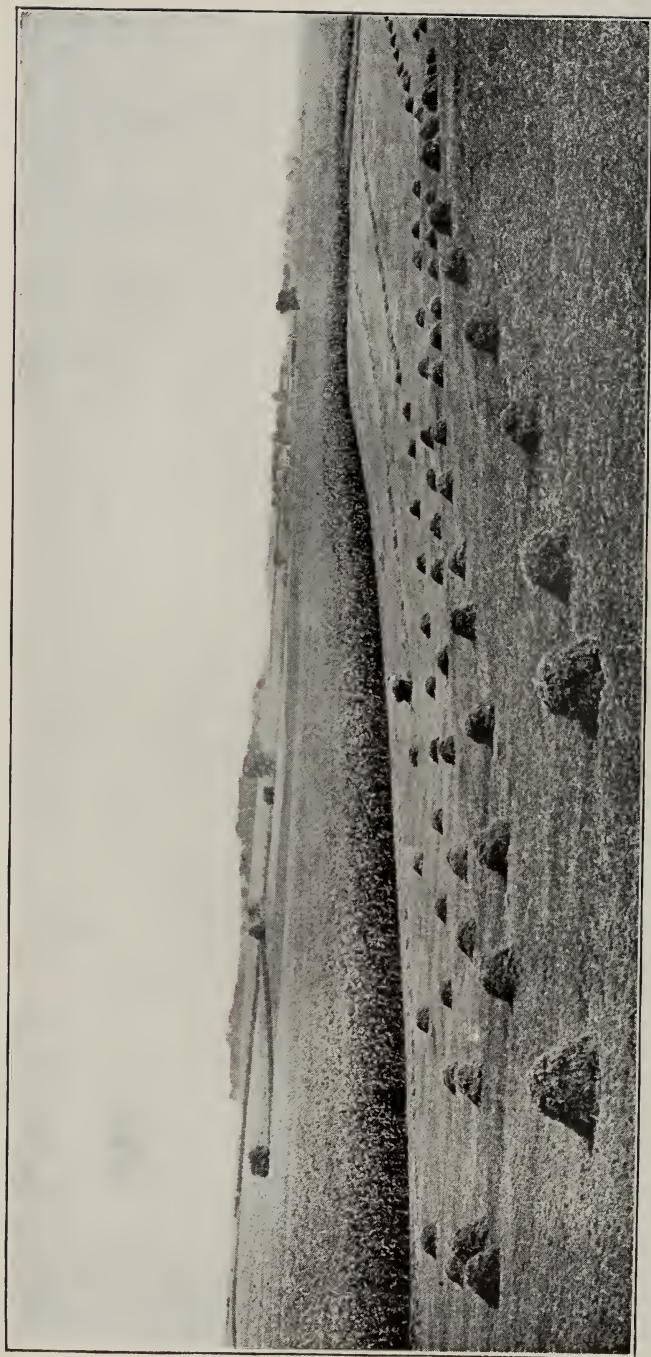
The crops raised were largely corn and alfalfa on about equal areas because these produce from two to four times as much digestible nutrients or feed value per acre as other common farm crops. This tremendous, almost unbelievable, fact is but partially understood even yet, as shown by the fact that less than five per cent of the tillable area of the United States is in clover and alfalfa and also by the buying of great quantities of high priced protein feeds that could just as well be grown on the farm. Hence the details of how these crops were grown and fed will be given, the yields, amount of digestible nutrients, and how the practical difficulties were met. Six consecutive years of such crops under all the varying conditions, with the total and average amount of feed, and the final goal—the amount of milk actually produced from it—will tell the story of larger production from a given amount of land and labor.

The Cows and Their Feed.

Good grade cows were used. They were permitted to run loose in a round barn, being allowed plenty of fresh air, and the freedom of a yard in suitable weather. The only feed given the cows was that raised on this area. Corn silage and alfalfa were fed in whatever amounts the cows would consume. Corn meal was added to the ration when needed and available from this land.

The record of production of each cow in milk and fat for every week in the whole six years was kept and is available. The production of the cows was quite remarkable when it is considered that so little grain was fed. The records show the great value of corn silage and alfalfa hay as the principal ration for all dairy cows, and it also shows that milk can be very profitably produced on these feeds without grain of any kind, excepting when cows are producing heavily.

The next article in this series will tell of the unusual yield and special suitability of corn and alfalfa as companion crops for dairy production.



Alfalfa and corn are crops producing approximately two to four times as much digestible nutrients per acre as the other crops commonly raised. Corn in the form of silage not only makes more digestible nutrients of both grain and stalks available, but has an added feeding value because of its succulence; and alfalfa, being a palatable feed high in protein and minerals, will balance the ration when fed in the right proportion with corn.

Corn and Alfalfa.

Profitable dairying depends as much on growing efficient high yielding crops as on keeping high producing cows. But the crop side, and especially the legume side, never has been considered half as much as the cow side. This is true in farm practice, in dairy investigation, and in dairy teaching. A great campaign of investigation and publicity revealing the poor, unprofitable cow, and showing the great value of the high producing cow and how to develop her, has swept over the country for more than a decade, widely establishing the absolute necessity for the good cow and the folly of feeding and milking the poor cow. This knowledge and the hundreds of demonstrations of it, have produced a great effect on dairy practice. Much progress has been made in the improvement of dairy herds.

We all understand that the dairy cow worth keeping must have a high ability to consume feed and manufacture it into milk. But we never have put our minds upon a similar and equally fundamental phase of dairying—that the crops grown upon an acre should produce a large amount of suitable material for making milk. The acre is an investment and the labor to cultivate it is an expense. It is just as necessary that this acre should produce a high yield of raw material for milk as that the cow should be an efficient manufacturer of milk.

In the Milk Per Acre Demonstration carried on for six years at the University of Illinois to determine the amount of milk and fat that could be produced wholly from the crops grown on a given area, the first necessity was the selection of the crops that would furnish the greatest amount of digestible nutrients or feed value, both per acre and per day's labor, and still supply a palatable, nutritious, and well balanced ration for dairy cows. The best basis on which to compare the efficiency of crops for this purpose is the digestible nutrients produced per acre, as shown in the accompanying table. The total amount of digestible nutrients produced by each crop per acre is shown graphically by the length of line after each crop below the table. The heavy

portion of the line represents the amount of protein and the light portion the carbohydrates.

Two Crops Above All Others.

A study of the table and graph shows that alfalfa and corn are crops producing approximately two to four times as much digestible nutrients per acre as the other crops commonly raised. Corn in the form of silage not only makes more digestible nutrients of both grain and stalks available, but has an added feeding value because of its succulence; and alfalfa being a palatable feed high in protein and minerals, will balance the ration when fed in the right proportion with corn.

FRASER SAYS

"The dairy cow worth keeping must have a high ability to consume feed and manufacture it into milk."

"The crops grown upon an acre should produce a large amount of suitable material for making milk."

"Alfalfa and corn produce from two to four times as much digestible nutrients per acre as other crops commonly raised. You can double the milk production per acre by growing these crops."

"All of this is sound reasoning and deduction, but how does it work? For six years we tested it, devoting our acreage almost wholly to alfalfa and corn. The result? Read the succeeding issues for the complete story."

Yields of Crops and Digestible Nutrients Produced Per Acre on Well Managed Farms of Good Soil in Illinois.

Crop	Amount	Yield Per Acre		
		Pounds	Pounds Digestible Nutrients	Total
			Protein Carbohydrates	
			and fat	
Oats (grain)	50 bu.	1600	147 908	1055
Corn (grain)	55 bu.	3080	240 2351	2591
(stover)	2 T.	4000	68 1359	1427
Total grain and stover			308 3710	4018
Timothy hay	1 ½ T.	3000	84 1397	1481
Clover hay	2 T.	4000	272 1585	1857
Alfalfa hay	3 ½ T.	7000	770 2961	3731
Bluegrass pasture			160 686	846

This is a revelation of the highest importance. A real understanding of it may nearly double the production of

milk per acre without materially increasing the cost for feed. Corn yields the highest amount of carbohydrates and total nutrients, leaving protein as the most necessary element for a companion crop to supply. The alfalfa hay from an acre contains nearly three times the total feed and nine times as much protein as an acre of timothy. In addition, alfalfa is more palatable than timothy and also keeps the cow's system in much better physical tone.

Reduce or Eliminate the Poorer Crops.

Timothy hay is not to be considered at all as a dairy crop—not a whit more than a cow that produces only seventy-five or eighty pounds of fat in a year. And yet at the time this demonstration was started, timothy hay was grown to feed dairy cows on a great many farms, and it is still used for that purpose.

Bluegrass pasture makes a still poorer showing of total nutrients though it has some special advantages of its own as it saves labor and is good for the cows. Oats are so low in feed value per acre that the amount raised should be reduced to a minimum. And an acre of clover hay, while excellent in quality, is greatly lacking in quantity, having only half the total feed value and only a third of the protein produced by an acre of alfalfa.

The Damon and Pythias of Dairydom.

Corn and alfalfa are inseparable dairy feeds. Protein is the highest priced constituent in dairy feed when bought in the commercial market, and the paramount advantage of alfalfa is that it is high in protein and thus a balancing feed, no less than in its remarkable yield. On these two great counts, most protein and greatest total yield of nutrients per acre, alfalfa is the premier companion crop of corn, doubling or twice doubling the feed value of any other farm crop.

These differences in production were never dreamed of, were in fact incredible until comparisons were made in feeding tests. The cows like all these feeds and there is good

feed value in all of them, but these feeds had never been compared as to quantity and suitability—the per-acre idea with its unit of investment and labor had never been applied.

Only Possible Choice of Crops.

A careful study of these facts made it evident that the demonstration area must be devoted almost entirely to corn and alfalfa, and this was done with the exception of a small amount of soiling crops some years, and rye as a catch crop after corn for pasture in the fall and spring. The acreages of corn and alfalfa were about equal, as these great companion crops almost exactly supplement each other to form a balanced ration.

All of this seems sound reasoning and necessary deduction, but how does it work out? This is what the demonstration was for—to carry good theory over into practical results and indisputable evidence. And this is exactly what the demonstration did under all the varying conditions and practical difficulties of six successive years, as the details in coming chapters will show.

The Highest Producer.

High yielding crops, good feed, and efficient cows all combined cannot give the maximum dairy production unless these factors are accompanied by or balanced with good care. Good care consists in keeping the cows comfortable. The cows in the Milk Per Acre demonstration at the University of Illinois were allowed to run loose on the lower floor of the barn. This proved an excellent practice during the six years of this demonstration. We had found by experience with the regular university herd that the way to make cows most comfortable was to run them loose.

Special Advantages in "Running Loose."

An investigation of this practice had been previously made in dairy herds not only in Illinois but also in adjoining states. The advantages were found to be that the cows have greater freedom in getting up and lying down, they do



Cow Comfort in the Barn on a Sunny Day in Midwinter with the Doors Open to Furnish an Abundance of Fresh Air.
High producers with large udders are more comfortable and give more milk when allowed to lie at ease in this

not lie in cramped quarters or positions, the cows keep cleaner than when confined to stalls, and the barn can be kept better ventilated since the cows can move about and will not suffer so much from a lower temperature. The sum of it all is much more ease, comfort, and satisfaction to the cows, all of which tend directly to better production. Running cows loose does require a little more floor space and also more bedding. There should be from eighty to a hundred square feet of floor space per cow including the manger, depending upon the size of the cow. It was necessary in this case to buy straw as very little bedding was produced on this area.

Health, Vigor, and Comfort.

Where sufficient bedding is available cows keep cleaner and are more comfortable when allowed to run loose in the barn. When housed in this manner cows are more healthy and vigorous, have more vitality, and better appetites, and work at higher efficiency than in poorly ventilated barns.

That cows are fond of fresh air was shown by the disposition of the herd to lie on the side of the barn where the fresh air was entering, even in the coldest weather.

Kindness and comfort are the cheapest essentials on the dairy farm, paying as high a rate of interest as any other factor. When a cow working at high efficiency is disturbed in any way there is a decided shrinkage in her milk, and this shrinkage comes out of her profit.

When fed twice a day the cows rested for longer periods than when fed three times. This extra rest seemed an important factor in the increased milk secretion.

But there would be plenty of straw available on an ordinary dairy farm. Where sufficient bedding is available cows keep decidedly cleaner when running loose than when confined to stalls.

While feeding and being milked, the cows were placed in rigid stanchions about one and one-half hours night and morning. The practice of keeping cows both night and day in such stanchions is strongly condemned, but rigid stanchions are both economical and convenient for confining the animals during the short time for milking and feeding.

One vital factor of success in caring for the cows was the abundant supply of fresh air furnished. The ventilating

flues were the hay and silage chutes, extending to the cupola of the barn, which were fifty feet high with a combined cross section area of sixteen square feet. Flues of this height and size create a good draft.

The seventeen windows, two feet six inches by four feet ten inches, and a large double door were also used to admit air, some of the windows being left open at all times excepting on extremely cold, windy days, and even then a few of them were left open an inch or two, the cows being given the most ventilation possible without allowing them to suffer from the cold. That cows are fond of fresh air was shown by the disposition of this herd to lie on the side of the barn where the fresh air was entering, even in the coldest weather.

When the weather was at all suitable the cows were allowed the freedom of the open air in a sheltered yard. When the yard was muddy, they were confined to the barn by means of a slatted gate which still gave them almost outdoor conditions.

A Great Advantage Commonly Lost.

Cows kept in this manner are more healthy and vigorous, have more vitality, better appetites, and work at a higher efficiency than when confined to a poorly ventilated barn as is the case with most dairy cows throughout the state. This method of keeping cows is in striking contrast with many dairy farms where cows are still kept in rigid stanchions nearly twenty-four hours per day and cramped on a small platform of cement with scanty bedding and with little or no ventilation which reduces their vitality. Of course, it would be unwise to commence keeping cows in this manner in the middle of the winter if they had been closely housed up to that time, but by commencing in the autumn, thicker coats are grown and greater resistance developed as the cows become accustomed to a lower temperature.

Sure Response of the Cows.

There is no question that such freedom and comfort of the cows and such means of a higher vitality constitute a

fundamental factor in milk production. Abundant oxygen for the blood is as essential as plenty of rich food for the body. And there is no question that such comfort and an adequate supply of oxygen are quite commonly denied to farm dairy herds. Too many herds live "at a poor dying rate" in tight barns and cramped quarters during the cold months and cannot possibly make as good use of their feed or as high production as they would with the greater comfort of freedom and plenty of fresh air.

Earning Power of Kindness and Comfort.

Of the many great services of Ex-Governor Hoard to the dairy farmers and to the dairy cows of the country, one of the most important was his teaching in a striking manner that the dairy cow was a mother and that she was entitled to kind treatment and a comfortable life. This is her only possible remuneration. Kindness and comfort are the cheapest essentials on the dairy farm, paying as high a rate of interest as any other factor; yet they are frequently neglected.

A good dairy cow has, by nature, a highly developed nervous system, and is very sensitive to the kind of treatment given her. Kindness is especially important at milking time, because that is when the milk is being secreted, yet that is most frequently the time when cows are abused or startled. Whenever they are disturbed or made uncomfortable there is a reduction in the secretion of milk. A cow producing even 20 pounds of milk per day is doing an enormous amount of work and one producing 40 pounds, or five gallons, per day is doing much more than a horse at the hardest kind of labor.

Losing One-fourth the Profit.

Since it takes about 160 lbs. of butterfat to pay for a cow's feed and keep, under ordinary farm conditions, and the average cow in Illinois produces 212 lbs. of fat, only the last fourth of what a cow produces goes for profit. If her total product is shrunk only one-eighth, it reduces the profit

one-half, because the cost of production would not be reduced. If a cow is treated so unkindly at milking time as to have her yield shrunk one-sixteenth, which is such a small amount as to be inappreciable unless the milk is actually weighed, yet it would reduce the profit from the average cow one-fourth. So kindness and comfort are of great economic importance as well as matters of right sentiment and humane treatment. Mr. H. E. Crouch, the superintendent who had charge of the cows for the six years, was at all times careful and considerate of their comfort which added much to the happy condition of her cow family.

Cows should get as much rest as possible as they are doing their best work when comfortably lying down a large portion of the time. When we started this Milk Per Acre demonstration the cows were fed three times a day, but it was some time after they had finished eating before all the cows were lying down, with the result that they were actually down only about an hour and a half in the forenoon and the same time in the afternoon. For this reason the feeding was changed to twice a day with the result that they were lying down practically all the time from ten in the morning until 4:30 o'clock in the afternoon, or six and one-half hours. This extra rest seemed to be an important factor in the increased milk secretion.

The care of the cows can all be summed up in the one slogan which should be in every dairy barn: Keep the Cows Healthy, Vigorous, and Comfortable.

Feeding Corn and Alfalfa.

No other feed except the crops that were raised on the twenty acres was given to the cows during the six years of the Milk Per Acre demonstration at the University of Illinois, and these crops were almost entirely corn and alfalfa. The cows were fed all of the corn silage and alfalfa hay they would eat, consuming an average of thirty-seven and two-fifths pounds of silage and fourteen and one-half pounds of alfalfa hay per day during the whole time.

The silage was made from a variety of corn commonly



Alfalfa Curing in Cocks Covered with Caps to Protect it from the Sun, Dew and Rain to Make the Hay More Nutritious and Palatable.

Alfalfa, the great companion crop of corn, produced an average of $3\frac{1}{2}$ tons of mow dried hay per acre for six years.

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grown for grain and planted slightly thicker than for the largest grain yields, but the corn was heavily eared. It was always fairly well matured when cut. The alfalfa hay was usually cured under caps, which caused it to retain its green color and made it more palatable. Experts in animal nutrition say that cows fed on hay cured in this manner are able to assimilate more lime than cows fed the same ration of alfalfa cured in the swath or windrow exposed to the sun. Some corn stover was available four years of the six, and the cows consumed the best parts of it, not over 15 per cent, the remainder being pushed back under the cows for bedding.

The cows on this Milk Per Acre demonstration produced an average of twenty and one-half pounds of milk per day during the whole six years, including the time dry. They consumed, in addition to silage and alfalfa hay, a small amount of soiling crops, rye pasture, and a little grain when they were fresh.

Cows Need Grain When Producing Heavily.

When cows are capable of producing more than 20 pounds of milk per day, some grain should be added to the ration, so that more nutrients shall be contained in a given bulk. When fresh, however, several of these cows consumed as much as 40 pounds of silage, and 15 pounds of hay per day for several weeks.

PASTURE PAYS

"The amount of milk was increased and the cows greatly benefited by going out to rye pasture," says Fraser. "The benefit seemed to last over for some time after the cows were taken off pasture. They seemed to do better and were more contented. It is strongly recommended that cows should be on some kind of pasture for at least two months during the year, and they certainly do better without silage or with only a small feed of silage for that time. The cows in this Milk Per Acre demonstration felt somewhat the lack of pasture. Sweet clover pasture may be grown on most farms if properly treated and it will yield three times as much feed as blue grass."

The only concentrate added to the ration was corn meal, which was from corn raised on this area. This was fed in amounts varying from 2 to 12 lbs. per cow per day, depending upon the cow's milk production and the amount of corn meal available. Usually the cows were fed from four to six pounds per day for a few months when giving the heaviest flow of milk. It is seldom wise to feed as small an amount or variety of grain to high producing cows as was done in this demonstration. One cow was fed as much as 12 lbs. of corn meal per day when giving a large amount of milk. This, in addition to the roughage, made a fairly satisfactory and balanced ration for a cow producing 45 lbs. of three and one-half per cent milk a day. Twelve pounds of corn meal per day is a large feed of such concentrated, compact grain, and it should be mixed with some lighter and more bulky feed if cows utilize it to the best advantage. This was accomplished by putting the corn meal on the silage in the manger at feeding time.

Rye Pasture Good Soiling Crop.

Small amounts of soiling crops other than green corn were fed for short periods when available and these crops took the place of a part of the usual alfalfa and silage ration, but as growing these was expensive, few soiling crops were raised except where the alfalfa was failing. Four different seasons rye was drilled in the corn ground after the silo was filled and the cows were allowed to pasture upon this for two or three weeks in the fall and again the same length of time in the spring. The feed thus obtained from rye pasture amounted to practically one-half the ration during the time the cows were on this pasture.

Cows should be accustomed to rye gradually. We gave them a full feed of their regular ration and turned them on rye only 15 minutes morning and night the first day, 30 minutes the second day, and so on. After a week they were out all day. A half ration of silage and hay kept their bowels from getting too loose and thus prevented the tainting of the milk.

Pasture Freedom a Great Benefit.

The amount of milk was increased and the cows benefited by going out to rye pasture. They ran, kicked up their heels, and played like calves the first few times they were turned out. The benefit seemed to last ever for some time after the cows were taken off the pasture. They seemed to do better and were more contented. It is strongly recommended that cows should be on some kind of pasture for at least two months during the year, and they certainly do better without silage or with only a small feed of silage for that time. The cows in this Milk Per Acre demonstration felt somewhat the lack of pasture. Sweet clover pasture may be grown on most farms if properly treated and it will yield three times as much feed as blue grass.

How Cows Were Fed and Watered.

The cows were placed in stanchions and fed twice a day. After the silage was well eaten they were given the alfalfa hay. An hour later the stanchions were opened and the cows went to the water tank, later returning to finish the hay. The tank was in the barn and the water was kept at a constant level by means of a float valve. Allowing cows to drink frequently is a high factor in milk production. They also had access to salt.

Cows Maintained Good Condition.

The cows kept in good flesh, excepting the heaviest milkers for a few months after freshening when they had no grain in the ration. But with the exception of one very heavy milker, all of the cows were in fine flesh and physical tone at freshening time each year. Such condition for six years speaks wonders for these feeds as a dairy ration.

Because of the large yields and economic production of corn and alfalfa, or even clover, these should usually constitute the exclusive ration during the winter for cows that are not producing over two gallons of milk per day. This includes the great majority of the cows in the United States for nearly all of their lactation periods each year when not on pasture. The feeding of this economical and

easily grown ration is one of the chief factors in producing such a large amount of milk per acre and doing it so economically in this demonstration.

The full meaning and some particular and exceptional features of this feeding will appear more plainly as a discussion of the results in succeeding articles.

Without Grain.

The Milk Per Acre demonstration at the University of Illinois was never intended to develop a method of feeding without grain, but that feature came into it as an incidental necessity; as a bit of practical experience it produced an astonishing result, one of the most convincing and important in the whole demonstration. The corn crop was so reduced one year out of the six that it took all of it for silage, leaving none to be husked and fed as grain. Since the purpose was to raise all the feed on the land, no feed was purchased and the cows were fed nothing but corn silage and alfalfa hay without grain during this year. It is not necessary and is not recommended that the dairyman limit the feed of his herd in that way; but it is fortunate that it was done in this test because it brought out as nothing else could the remarkable feed value of corn silage and alfalfa hay.

Twelve Cows Averaged 284 Lbs. Fat.

The cows produced on corn silage and alfalfa hay without grain an average of 8,318 pounds of milk and 284 pounds of fat in one year from the time each cow was fresh. This production of both milk and fat was higher than the average production per cow per year for the whole six years. These records for one year had an advantage, of course, over the six years' records because in every case the one-year record began at the first or highest point of the cow's milk flow and continued for 365 days. Such a record would not include the low production at the close of her period or any time the cow might be dry if the lactation period extended beyond the one year. Since these factors did enter to reduce the six-year record, this one year's



On a ration of corn silage and alfalfa hay, cow A produced an average of over 42 pounds of fat per week* for five consecutive weeks, having received no grain for 20 months before or during the time this record was made. On this ration she averaged 42 pounds of milk per day for five weeks, and over 34 pounds of milk per day for four months, producing 7,335 pounds of milk and 275 pounds of fat without grain at year. Although she was not a persistent milker, her average yearly production was 7,642 pounds of milk and 270 pounds of fat including the time dry. She ranked third cow in the herd in the production of fat and the fifth cow in the production of milk. Her largest yearly production was 9,586 pounds of milk and 380 pounds of fat. She had received no grain for 20 months when this picture was taken. She was 5 years old and in good condition at the close of the demonstration.

*This amount of fat for one week was the standard set by the Holstein-Friesian Association for admission to advanced registry for mature cows at that time. In making advanced registry records, however, cows are usually in high flesh before freshening and fed a heavy grain ration during the time they are making a record.

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production without grain cannot be compared with the six year's production of the whole demonstration. No such comparison is intended.

In this milk per acre experiment it was not expected to try out feeding roughage alone but to see what cows would do without purchased feed. One year the corn crop was poor and there was not enough to supply corn for husking. However, the twelve grade cows averaged 8318 lbs. milk and 284 lbs. fat, consuming 39 lbs. silage, 15.3 lbs. hay, and the equivalent of 1 lb. hay in soiling crops. This is not an argument for not feeding grain, but is an argument for the large value and economy of silage and alfalfa hay.

Marvelous Results from Roughage Alone.

The fact remains, however, that this unprecedented record, not planned at all nor foreseen, but which developed from practical difficulty, showed that 8,318 lbs. of milk and 284 pounds of fat per cow were produced from twelve cows fed on silage and alfalfa without grain. And these were grade cows, only one of which was an exceptionally high producer. They produced an average of 22.4 lbs. of milk per cow per day and consumed an average of 39 pounds of corn silage, 15.3 pounds of alfalfa hay per day, and a small amount of soiling crops that if dried into hay would have equaled about one pound per day. That is the tremendous fact attesting the high food value and almost perfect suitability of these companion crops as a dairy feed.

What it Does and Does Not Mean.

Undoubtedly these cows would have produced more milk and would have done it more economically had they had some grain for a few weeks immediately after freshening. While the results of feeding roughage alone do not mean that cows producing heavily should not be fed grain, it does show in a most forceful manner the great value of good corn silage and alfalfa hay as the principal ration for all dairy cows and as a complete ration for cows during the winter season when they are not producing over 20 pounds of milk per day. It is a well known fact that digestible

nutrients are usually produced more cheaply in roughage than in grain.

Condition of the Cows.

All of the cows but one were in fine condition at the close of the year on corn silage and alfalfa hay without grain as may be seen from several of the pictures accompanying this article. One cow, the best milker of all, produced 10,430 pounds of milk containing 351 pounds of fat. She was producing too heavily to keep in normal condition without grain and so became somewhat emaciated and out of condition. Notwithstanding big production on corn silage and alfalfa alone, it is recommended that when cows are producing more than 20 pounds of milk per day they should be fed some grain.

Milk Per Acre.

It was the purpose of the dairy demonstration at the University of Illinois to produce the most milk per acre and raise all the feeds on the farm. Since digestible nutrients can usually be produced more cheaply in roughage than in grain, cows capable of handling large amounts of roughage were the kind desired. Naturally this meant cows of large digestive capacity. Grade Holsteins were chosen because they answered this requirement, and were the kind of cows generally kept in the intensive districts of the state in both the vicinities of Chicago and St. Louis; besides, it would be more practical and convincing to have the demonstration compare as closely as possible with the common dairy practice of the dairy regions of the state. These cows were the best that an experienced man from the dairy department could select and purchase at a reasonable price. They were no better than the best dairymen select, but they were better than the average dairyman purchases on such a buying trip, as proved by the sustained health, good production, and vigorous condition of these cows throughout the long period of the demonstration.

In this article and Parts V and VII, eleven of these



Cow H produced an average of 7,502 pounds of milk and 257 pounds of fat per year including the time dry. She ranked the sixth cow in the herd in the production of both milk and fat. Her highest record for one year was 10,129 pounds of milk and 367 pounds of fat. On corn silage and alfalfa hay without grain she produced 7,555 pounds of milk and 257 pounds of fat in one year, averaging 38.1 pounds of milk and 1.18 pounds of fat per day for eight weeks. She had received no grain for over a year when this picture was taken, yet she was in a fine, sleek condition.

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cows are shown in cuts that clearly indicate the type and character of the animals and their condition after several years of the feeding, care and production described.

Eleven records on as many cows for a period of six years are reported in this installment of "Most Milk Per Acre." In the six years these cows went through all the experiences that are usually encountered on the dairy farm. They averaged a better production than is shown by the best one-fourth of cows in Illinois and remained in good condition when fed mainly on corn silage and alfalfa hay.

The eleven cows pictured in these articles were in the herd for nearly the entire six years of the demonstration, nine of them remaining in the herd at the close. The heaviest producers became somewhat thin after milking heavily for a few months. This was especially true the year that they were maintained on corn silage and alfalfa hay without grain, but all the cows, with one exception on two different years, were in excellent condition at every freshening time—showing how well they were maintained on these feeds for so long a period.

Comparatively little trouble was experienced from sickness or disease during the six years. One cow died and it was thought at the time that her trouble might be impaction of the rumen from such a large amount of rough feed. A post mortem held by the university veterinarian showed that she had not suffered from impaction but had died from heart trouble which had nothing to do with the manner in which she was fed.

How the Cows Produced.

The average production per year of each of the 11 cows and their order according to the production of fat is given in the accompanying table. The milk of these cows was weighed at every milking for the six years. The several pages of these figures in the university records show all the ups and downs of production of each individual. They also show the high and low periods of each cow, the length of time dry, and the years that she was in the herd. Only the

total production of the 11 cows longest in the herd, however, are given in this article.

It is obvious from a study of the table that cows producing the most fat do not always produce the most milk. Cow E, the best one in fat production and the fourth in milk, produced an average of 292 lbs. of fat and 7,861 lbs. of milk per year. The lowest producer, cow G, averaged 231 lbs. of fat and 6,170 lbs. of milk. The whole range in fat production was only 61 lbs. The highest cow was 21 lbs. above the second, proving her in a distinct class from the others, but the next four cows had almost the same fat production, varying only three pounds.

Average Yearly Production of 11 of the Cows.

Cow	Fat	Milk	Rank in Production	
	lbs.	lbs.	fat	milk
E	292	7861	1st	4th
K	271	7306	2nd	8th
A	270	7642	3rd	5th
I	269	8965	4th	1st
D	268	7149	5th	9th
H	257	7502	6th	6th
J	252	8083	7th	3rd
C	242	7475	8th	7th
F	236	8251	9th	2nd
B	231	6879	10th	10th
G	231	6170	11th	11th

Cow I, which was fourth in fat production and first in milk, gave 23 lbs. less fat than the first cow, but produced 1,104 lbs. more milk per year. She produced 2,795 lbs. more milk than cow G, the lowest producer of the 11 cows in both fat and milk, and 714 lbs. more milk than any of the other cows. Cow F, although next to the highest producer of milk, averaging 8,251 lbs., with the ninth cow in production of fat. Cow J was third in milk, but seventh in fat production.

The best cow in fat production produced 61 lbs. or 26 per cent more fat than the poorest cow. The best cow in milk production produced 2,795 lbs., or 45 per cent more milk than the poorest cow. The two highest producers of fat, cows E and K, produced an average of 50.5 lbs. or 22

per cent more fat per year than the two lowest producers, cows B and G.

The two highest producers of milk, cows I and F, produced an average of 2,083 lbs. or 32 per cent more milk per year than the two lowest producers, cows B and G. This shows that the cows varied more in milk than in fat production.

There were 59 calves dropped during the demonstration but they were disposed of as soon as the milk of the dam was good; thus the problem was simplified in this case to the amount of milk that could be produced per acre on this land, and was concerned only with the cows and the crops. Of course, this method is not recommended for the general dairy farmer, because practically all dairy farmers should raise sufficient heifers from their best cows mated with a good pure-bred sire to replenish their herds.

These cows went through the varied experience, practical difficulties, mishaps, unforeseen or unavoidable conditions and contingencies that would naturally come in a period of six years. But the vital fact of it all, the indisputable evidence, is that the cows produced an average of 7,470 lbs. of milk and 262 lbs. of fat per year for six years—a distinctly better record than was shown by the best fourth of the dairy herds in Illinois—and remained in good, vigorous condition under these economical methods of cropping and feeding.

Farm Feed Alone.

The character, condition, and production of the cows in the Milk Per Acre Demonstration at the University of Illinois were shown in the last articles, Parts V and VI of this series. Each cow produced an average of 7,470 pounds of milk and 262 pounds of fat per year for six years upon corn and alfalfa, when all the feed was grown on the demonstration farm, including one year when there was no corn meal to feed. Although this record surpassed that of the best one-fourth of the dairy farm herds of the state, this is not the significant point. The demonstration was to show production per acre with farm feeds economically produced. There the record is far more outstanding.

The average milk per acre produced in this demonstration for six years was 3,888 pounds containing 136 pounds of fat; this was nearly twice the amount produced on the best strictly dairy farms in Northern Illinois and nearly four times the amount produced on the poorer farms where no young stock was raised. An investigation was made of the production of milk per acre on some of the strictly dairy farms in Northeastern Illinois. The highest yield found was 2,145 pounds milk per acre, the second highest was 1,412 pounds, the lowest 994 pounds, and the average was 1,402 pounds. Of course, horses were kept on these farms, but from \$400 to \$1,500 worth of feed was purchased which would make up for the feed consumed by the horses.

Records Maintained for Six Years.

This average of milk produced per acre might not be remarkable nor mean much for one year, but when it is maintained for six years under all the varying conditions of the herd, and under the still greater differences in the yearly amount of feed produced, it makes a reliable, balanced and established showing. We hear a great deal about one splendid cow or one good year that might come to any dairyman and any herd. But in this period of six years the herd was subject to all the ups and downs, fortunes and misfortunes that would naturally come to any farm herd. It was also subject to all the mistakes that might be made by any good dairy farmer, and to all the high and low crop yields due to weather and field conditions. In fact, insect injury to corn during the six years was decidedly more than need be on the ordinary dairy farms.

ONE HUNDRED SEVENTY POUNDS BUTTER PER ACRE.

This demonstration was to show production of milk per acre where cows were fed alfalfa, corn silage, and corn grain, all farm grown feeds. The average milk production per acre for six years was 3,888 lbs., containing 136 lbs. fat (equivalent to 170 lbs. butter). This is nearly twice the amount produced on some of the best dairy farms in Northern Illinois.



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Dairymen Develop Herds as Good.

Good producing cows are the only ones with which the dairyman has any business. The problem of the dairy farmer, therefore is to secure cows of this type. A number of dairymen who started with reasonably good cows, by selecting and grading up with a pure-bred sire, have in comparatively short time built up a herd as good as the one used in this demonstration.

Since only practical farm methods were used in the production of the crops and in the feeding and care of these grade cows, this demonstration means that the high results were economically produced, and that is certainly a paramount factor in Illinois dairying today.

A Balanced Result.

The average production of these demonstration cows was not extremely high, but their feed, care, housing and management were all in balance with the quality of the cows, and this resulted in a far higher production of milk per acre than could have been the case with the same cows under ordinary farm practice, which nearly always contains some poor conditions that reduces the yield.

The tremendous results obtained from having all the factors fairly well balanced is one of the chief lessons in this demonstration. That is a feature in dairying very generally overlooked. Cows as good or better than these would never produce this quantity of milk per acre unless such crops were chosen as would make a high yield of the right feeds. Unless the feeds were palatable and succulent and contained plenty of protein and minerals, the cows could not make so much milk. The great companion crops, corn and alfalfa, provide all these conditions in a balanced way and to a higher degree than any other farm crops known. If the feed, freedom, comfort and fresh air given to the cows in the barn had not met all requirements to keep these cows healthy, vigorous, and in good flesh, for the long period of six years, they could not have produced so well. The Milk Per Acre demonstration was successful because pains were

taken that all conditions of cows, feed, care and housing, were equally good. With all these factors fairly balanced, astonishing results were secured.

Results of This Demonstration.

Doubling the production of the best dairy farms in a steady six-year run of practical and economical dairying is obviously worth doing. It should challenge the best thought and highest ambition in the dairy field. The balance of right crops, right cows, right feed and care of the cows spells outstanding and economical success in plain, practical farm dairying, without introducing any extraordinary element unless it be giving the right place to alfalfa.

Yield Per Man.

The area chosen for the Milk Per Acre demonstration at the University of Illinois was surveyed and the 20 acres enclosed by a fence built exactly on the line. An additional acre was occupied by the buildings, yards, and garden, one-third of this acre being used for the barn and cow yard. So $20\frac{1}{3}$ acres were devoted to the production of milk.

This was the poorest piece of land on the University farm, selected because it was similar to much of the soil on which dairy farming is conducted. It was somewhat rolling and had been continuously cropped for many years. About three-fourths of the area was brown silt loam; one-eighth, gray silt loam on tight clay; and the remaining portion gravelly loam.

Enough manure was produced by the cows to apply 10 to 12 tons per acre on the corn land each year and this was the only manure used. The summer manure was hauled out in the fall, and the land thus covered plowed and the remainder of the corn land was manured and plowed the following spring.

The land was disced and harrowed to prepare a good seed bed and planted to corn about May 10th, drilling the corn one kernel every nine inches in the row. The land was then harrowed and after the corn was up it was culti-

PRODUCTION PER MAN.

High yield per acre must be secured economically and return to the farmer a good profit to be of any significance to him. High yield per man as well as high yield per acre was attempted in this demonstration.

The proper balance between production per acre and production per man is what determines the farmer's income and the standard of living that he can afford. Production per man must be kept high in this country if we are to keep intelligent people farming the land and if we are to produce a surplus of food for people in other occupations.

vated with a weeder to kill the weeds in the row. Later it was cultivated three or four times with a two-row cultivator. The amount of work put upon the preparation of the land and tilling the crop was the usual amount under good farm conditions.

The accompanying cuts show the manner in which the soil was tilled and the corn crop grown and handled.

Soiling Crops Not Economical.

The second year of the demonstration one and a half acres of soiling crops, oats and Canada peas, were seeded together as early in the spring as the ground could be worked, and these were cut green and fed to the cows. The ground was then plowed and seeded to cowpeas which were fed green for soiling just before frost. The third year a poor acre of alfalfa was plowed up after the first cutting and thirteen tons of green feed raised on this land. The fourth year cowpea hay was grown on that spot, and the fifth year oats and soy beans. All of these soiling crops added so much labor and so little feed, as compared with good corn or alfalfa, that they are not recommended as practical.

But Fine Results from Rye Pasture.

Rye was sown in a portion of the corn field immediately after silo filling four different years: the first, second, fifth, and sixth years. This bit of green feed was highly valuable to the cows and economical as it required but little extra labor.

One difficulty in pasturing cows on rye in the spring where the soil is largely clay, is that tramping the land when wet causes it to become very hard. For this reason, the rye pasture should be confined to as small an area as possible.

Sweet Clover Better Than Rye.

There is no question that catch crop pasture can be grown to add greatly to the feed, to the variety of feed, and to the health and tone of the cows, without displacing any regular crop on the land and with but slight cost. In the light of the last several years' experience on many dairy farms, sweet clover makes a far better catch crop than rye for fall and spring pasture. But where clover pasture is not available and blue grass is the kind used, a small amount of rye pasture is positively to be recommended for use in the spring. The cows can be turned on this early and by pasturing the rye long enough, the blue grass pasture is allowed a good start.

Production Per Man.

Farmers in foreign countries often are lauded because the production per acre is greater than in the United States, but labor is cheap there and they obtain their high yields per acre at a great reduction in yield per man from what we get here. The high yield per acre must be secured economically and return to the farmer a good profit to be of any significance to him. High yield per man as well as high yield per acre was secured in this demonstration. The total hours of man labor put upon this twenty acres and ten cows averaged for the six years about three-fourths of what one man does on the ordinary dairy farm. Only such methods were employed in raising crops as are in common practice on the best dairy farms. As little hand labor as possible was used and large tools were employed because they are economical of man labor. The farmer in charge of 80 to 160 acres would have some natural advantages in economy of labor that could not be secured in a demonstration like this.

Increased Yield Without Increased Labor.

Notwithstanding the greatly increased milk per acre on this demonstration, the amount of labor per acre required to raise the crops was about the same as on ordinary farms where good methods are practiced. That is a vital feature of this demonstration and one of the most practical and profitable elements to secure on any dairy farm. The proper balance and production per man is what determines the farmer's income and the standard of living that he can afford. Production per man must be kept high in this country if we are to keep intelligent people farming the land and if we are to produce a surplus of food for people in other occupations.

Most Out of Alfalfa.

The alfalfa that played so large a part for six years in the Milk Per Acre demonstration at the University of Illinois was seeded with beardless barley as early in the spring as the ground could be worked, and a very good thrifty stand secured. The barley was cut for hay when the grain was in the dough stage.

This method of seeding with small grain in the spring is now quite generally followed by Illinois dairymen and has proven successful and practical. It means a regular grain crop on the land the same year the alfalfa is started, and this outstanding economy cannot be overlooked. However, it does require that the ground be free of weeds, well supplied with organic matter, and in excellent condition from previous good tillage.

It was the custom to cultivate the alfalfa with a spring tooth harrow each season as it began to grow. Also immediately after the first cutting of hay the alfalfa was again cultivated when the soil was in condition and labor looked available and much grass was destroyed by this cultivation if the sun was shining. However, such cultivation might not be economical if the alfalfa is in good condition and no blue grass is getting a start in it.

Harvesting Alfalfa.

The alfalfa was cut in the late afternoon when there was the least moisture in the plants and when the leaves would not become dry and brittle before night. As soon as the dew was off the next forenoon and the hay was thoroughly wilted but before the leaves were dry enough to shatter, the hay was raked into windrows with a side delivery rake. These were then put into cocks, building the cocks fairly high and small at the base. When the weather looked threatening, the cocks were covered with caps having a small cement ball fastened on each corner with wire to prevent the cap from blowing off. The hay remained in these cocks until it was fairly well cured, the leaves drawing the moisture from the stems and allowing it to pass into the air, the time required varying from two to five days depending upon the weather.

When the hay was ready to put into the mow, the cocks were opened by tipping one-third of the cock in either direction along the windrow. If the weather had been damp and the alfalfa had not been well cured, it was opened out to dry for an hour or more before being taken up by a hay loader and a wagon that was driven along these windrows. The loader saves much time and labor. In this way the hay was placed carefully on the wagon without shattering the dry leaves which are the most valuable part.

Curing the alfalfa thus in the cocks does require some more labor than curing it in the swath or windrow; but the extra labor is paid for many times over in the better quality of hay secured. Many years ago Governor Hoard insisted that alfalfa hay cured under caps had a much superior feeding value and it recently has been brought out by Professor Hart of Wisconsin that alfalfa thus cured in the cock under caps is of the greatest value in feeding good dairy cows, as the green alfalfa hay aids them in assimilating much more of the minerals contained in the ration than would the dry and bleached hay cured in the swath or windrow.

Valuable Hay if Properly Cured.

The great advantages of alfalfa hay are its palatability, its high mineral content, its ability to help animals assimilate more minerals from the ration, its relatively large vitamine content, its great yield of nutrients per acre, and especially its high protein content. But to secure these advantages, the alfalfa hay must be protected from the sun, dew and rain in curing.

The hay should remain in the swath just long enough to wilt, but of course it must be wilted before it can be raked properly.

Much Loss in Common Curing.

It has been estimated that at least half the alfalfa is cured in the swath where the sun, dew, and occasional rain bleach the leaves, and that only 10 per cent is cured in cocks and almost none under caps. When cured in the swath the leaves become dry and brittle and a large percentage shatter off and are lost when the hay is raked into windrows. This loss is tremendous because alfalfa leaves contain about nine times as high a percentage of protein as do the stems. From 75 to 80 per cent of the protein contained in the alfalfa crop is usually in the leaves. And one of the chief reasons for growing alfalfa is for its protein to balance up the excessive amount of carbohydrates in corn. Hence, if we do not retain the leaves in the alfalfa hay, we might as well not grow the crop because timothy hay contains nearly twice as much protein as alfalfa stems.

Many farmers who pitch the hay onto the wagon by hand do not put the hay into cocks until after it is dry. In addition to losing leaves when hay is handled in this condition, cocks made of dry hay will not turn water nearly as well as if made while the stems are yet green.

On these two counts, then, bleaching and losing the leaves by shattering, the hay not only loses weight but the best and richest part is lost, and the part that is saved is decidedly unpalatable in comparison with hay cured in cocks under caps. Such hay cannot have the six high qualities mentioned above.

Alfalfa and Alfalfa.

It will not do to say that alfalfa is alfalfa. Bleached in the sun and raked when dry, it may be only the faded and tasteless semblance of alfalfa, the stick and skeleton of the former plant that was rich and fat with nutriment and most inviting to the palate. Half its value may be gone and yet it may resemble alfalfa. The cows will not eat half enough of this poor stuff, and if they ate twice the ordinary weight of it, still it would not fill its place in the ration for its most valuable properties are gone or greatly reduced. It is no longer the good alfalfa hay of which we have been speaking.

The methods of handling alfalfa in this demonstration preserved its good qualities and are not difficult to apply; they reduce the uncertainty and the difficulty of the process. It is a great advantage to cure the hay slowly in the cock instead of rapidly in the bleaching swath. The caps are insurance against bad weather and a big loss. Without caps, a long rain means ruined hay and an ordinary rain means at least bleached and damaged hay. But with caps, the hay may be cocked promptly while green and retain all its leaves; and once under caps, it is comparatively safe for several days.

Extra Cost Fully Warranted.

The cost of caps and the extra labor involved in putting up alfalfa in the way described, gives a great advantage and there is no possible question but that it pays a big return to thus properly cure the alfalfa that is to be fed to high producing cows. From practical experience the writer knows full well the press of work on the farm when the first crop of alfalfa is ready to cut. But from this demonstration and from observation upon many farms for many years, he is very positive that the alfalfa should be cured in cocks under caps wherever the labor can possibly be secured.

Applied to Farms.

This Milk Per Acre Demonstration, which is the theme of this series of articles, was in no sense a model dairy farm. In order to bring out distinct and conclusive evidence upon the main objects, it was necessary to follow some plans that would not apply in dairy farming. The farmer would be free from certain limitations and disadvantages that could not be avoided in this demonstration. The value is in the foundation factors or principles of dairying proven out through this six years of practical experience and high results.

Only twenty acres were available to raise the feed for the demonstration, but that particular size of area has nothing to do with the application of the results obtained to the farm. The farmer may use whatever size of farm he has or whatever part of his farm he wishes to devote to cows and raising their feed. There is no necessity at all for the dairyman—as there was in the demonstration—to produce every bit of the feed on any certain number of acres set apart for dairying, but there is high reason for him to produce it himself.

Advantages on the Dairy Farm.

The main feeds are to be the same—corn and alfalfa—because they are the greatest yielding companion crops containing suitable food elements. Sweet clover pasture should be substituted for these as much as possible for the summer months. The farmer will grow small grain to feed the cows when producing heavily and have the straw left for bedding and possibly wheat to sell as a cash crop. His corn need not be grown continuously on the same land but can be rotated with small grain and sweet clover or soy beans according to approved methods of crop rotation; and much more corn may be grown than will be needed for the cows which, of course, may be sold or fed to other stock.

Scarcely ever would there be need for him to feed no grain, as there was one year in this test, because he would have the corn in excess of what went into the silo. He would not need to grow corn continuously on one field and

run into trouble with insects and corn rots, which seriously reduced the crop during two years of this demonstration. Plowing up the alfalfa while still producing well was necessary and a serious disadvantage in this demonstration. The farmer by having a field of alfalfa separate from the regular rotation does not need to do this but could get his new seeding started before plowing up the old.

All these advantages are his because the dairyman has a real farm with other fields besides those devoted exclusively to dairying. In many instances he would have broken land adapted only to permanent pasture and this would be an advantage to the cows as well as saving labor, in which case soiling crops need not be grown unless his circumstances gave some special advantage to it.

Improvement of Any Factor Helps.

The ventilation of the barn and comfort of the cows—preferably running loose in the barn—are of the greatest advantage. The best cows the dairyman can get are essential—grade or pure-bred—and this will include the use of a pure-bred sire.

Any advance in growing the greatest amount of suitable feed per acre and balancing corn with alfalfa, is in line with this demonstration and its teachings. But alfalfa is essential. The corn silage is essential. To buy none or the least amount of protein feed is a high point of economy. In many cases increasing the alfalfa or legumes ten times is a mountain peak of necessity.

Although the soiling crops grown were no part of the demonstration plan, but were raised to use the ground where the regular crop had partially failed, they are seldom necessary and never economical of labor.

The demonstration shows a high point of economy in growing all the feeds upon the farm and buying none. It seemed best to hold this test strictly to that rule. But in dairy farming it may sometimes be best to buy some bran or protein feeds for high producing cows. There can be no objection to the purchase of such feeds except the one of economy. Alfalfa and sweet clover will supply the protein

minerals, and toning-up feed much cheaper than it can be bought in the market.

Triangle of Dairy Factors
That Produced 3,888 Lbs.
of Milk Per Acre on
Home Grown Feeds
Alone, as the Av-
erage of 6 Yrs.,
Under Prac-
tical Farm
Condi-
tions.

The farmer may grow red clover instead of alfalfa; it is a legume and to a certain extent will serve the same purpose in the rations, but the yield is much less than that of alfalfa, and alfalfa is nearly one-half better pound for pound to furnish protein; consequently the cow of high production cannot eat enough of clover to balance her ration. So it is not as economical as alfalfa and it cannot take the full place of alfalfa in the ration. In fact, many are beginning to question if red clover has any place on a farm where the soil will grow alfalfa and sweet clover.

As land becomes higher and higher in price, the question of permanent pasture becomes a vital issue. There was no permanent pasture on this demonstration and yet the cows did well. The dairy farmer may feel that he must have such pasture. Certainly there should be the minimum of it except upon cheap land or land that cannot be cultivated. But a stronger word is yet to be said for sweet clover pasture.

Such crops as mangels, sugar beets, and carrots could have been raised in connection with the corn and alfalfa, and might have increased the milk per acre, but the extra labor required would have reduced the profit per man, and in practical dairy farming economy of production is just as essential, is more essential, than amount of production.

There is no dairy farm or general farm where cows are kept which cannot apply the fundamental practices of this demonstration.

The Inevitable Issue.

The great fundamental hub of dairy farming on high-priced land where practically all is tillable, is the amount of milk and butterfat produced per acre when this is done in an economical manner. There are two parts to this: first, the production of crops that furnish the largest amount of digestible nutrients per acre and that form a palatable, well balanced ration for dairy cows, which hinges upon the selection of the kind of crops and the proper tillage and harvesting of these so as to get the greatest possible use of the soil; second, efficient production of the cow which usually means high production because efficiency in dairy cows is determined very largely by the capacity of the cow to consume feed above maintenance and convert it into milk.

Not simply the most per acre but the most per acre and per man—the highest economic production—is the inevitable goal of dairy farming. There are no conditions under which that does not apply, and never will be. It may be wise or necessary at times to decrease the total amount of the production of a commodity to agree with the demand, but never to grow less per acre when there is more profit in a larger yield. The very reason for decreasing the output in such cases is identical with the ever present reason for the greatest economy of production—greater clearer profit.

Corn and Alfalfa.

The great benefits of corn and alfalfa, as proven in the Milk Per Acre demonstration for six years at the University of Illinois, were not alone in the high yield, but also in the fact that alfalfa balances corn which is low in essential protein and minerals for a dairy cow giving a good flow of milk. Corn silage and alfalfa hay alone, without grain, are well balanced and quite suitable for a cow's ration and very efficient for cows producing no more than 25 pounds of milk, as this demonstration has shown. In fact, where good alfalfa hay is fed, there is an excess of protein, and corn meal may be added in any quantity up to 12 pounds and this ration still will be in balance.



Cow J was of dairy type, milked easily, and had a good disposition. She averaged 8,083 pounds of milk and 252 pounds of fat per year, including the time dry. She ranked the seventh cow in the herd in the production of fat and the third in the production of milk. Her best yearly production was 9,677 pounds of milk and 300 pounds of fat. She gave in one year on a ration of corn silage and alfalfa hay without grain 8,063 pounds of milk and 246 pounds of fat. While on the above ration she produced an average of 38.8 pounds of milk and 1.24 pounds of fat per day for eight weeks. The picture was taken near the close of a year's production.

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Saves the Dairyman's Greatest Expense.

That alfalfa supplies the protein so abundantly is remarkably significant to dairymen in the corn belt, because it is the common practice to buy protein feeds to balance the ration. These are the high-priced feeds, and the dairyman's bill for bran, oil meal, cottonseed meal, gluten feed, and various mixed feeds amounts to several hundred dollars.

This large expense that reduces the dairyman's profit may be greatly recuded by growing sufficient alfalfa. It is not necessary to buy protein feed at all except for high producing cows. Alfalfa supplies it and great yields of alfalfa may be cheaply grown on the farm. To do this is one of the greatest possible economies, and also one of the easiest and most practical economies the dairyman can introduce. Yet, from the meager amount of alfalfa, and even the small percentage of combined acreage of clover and alfalfa grown in the United States, it would seem that he has scarcely yet begun to realize the absolute need and the great value of these crops to feed with corn. To get this precious protein, it is only necessary to utilize the free atmosphere and sunlight on every farm by growing legumes. This failure to grow alfalfa and clover is a tremendous waste.

The only possible conclusion is that these facts about alfalfa are not generally known today. The great economy of this companion crop is not realized. We know that legume hay is desirable and that there is not a better feed for a cow than bright green alfalfa hay. But we do not take in the meaning of these three links of economic dairying: milk cannot be made without a certain proportion of protein; clover and alfalfa are the only farm crops that are rich enough in protein for high producing cows; clover and alfalfa are the only farm crops that yield enough per acre to match an acre of corn.

It Takes Hold of Us Now.

That is why the results of this demonstration are given at this time. General dairy thought and practice have ad-

vanced far enough—and only just far enough—to make us all ponder the enormous loss and waste in not growing legumes, as shown in the recent census and a survey of dairy farms; and to lead us seriously to consider how easily this missing link is supplied by growing enough of the wonderful alfalfa to accompany the corn fed to cows, and to realize the tremendous economy of it. Certainly we are ready for it now, and such experience will be studied to an extent that would have been impossible a decade ago.

ALFALFA, COMPANION CROP WITH CORN, MAKES A PERFECTLY BALANCED RATION.

For the maintenance of a cow weighing 1,000 lbs. and the production of 25 pounds of 4 per cent milk, she requires daily: Corn silage, 35 lbs.; corn meal, $5\frac{3}{4}$ lbs.; alfalfa hay, 12 lbs.

The alfalfa in such a ration supplies $\frac{5}{8}$ of the protein, $\frac{1}{3}$ of the carbohydrates and fat, and $\frac{3}{4}$ of the minerals. The corn provides $\frac{3}{8}$ of the protein, $\frac{2}{3}$ of the carbohydrates and fat, and $\frac{1}{4}$ of the minerals.

Alfalfa Supplies the Minerals.

A cow cannot change the composition of her milk and if she produces a large amount, there must be used a considerable quantity of the minerals, calcium and phosphorus. If these are lacking in the ration, the cow must extract them from her bones as long as they are available. If the animal must extract phosphorus from her bones, she must also take from them the amount of calcium combined with that phosphorus, even though there is an excess of calcium in the ration at the time. Low producing cows get sufficient minerals with their ordinary ration, but high producing cows, the only kind profitable for the dairyman to keep, require minerals in a greater quantity in the making of milk, and cows soon run down in flesh and vitality if compelled to take minerals from their skeletons. Alfalfa is one of the best feeds grown on the farm to supply these minerals, and when fed in sufficient quantity will keep the cows in excellent physical tone.

The accompanying diagram shows how well alfalfa hay combines with corn to make a balanced ration. To

maintain a cow weighing 1,000 pounds and enable her to produce 25 pounds of 4 per cent milk, a daily ration of 35 pounds of corn silage, 12 pounds of alfalfa hay, and $5\frac{3}{4}$ pounds of corn meal must be fed. This ration contains 15 pounds of carbohydrates and fat, 2 pounds of protein, and .22 pound of minerals. The corn (silage and meal) provides $\frac{2}{3}$ of the carbohydrates and fat, but only $\frac{3}{8}$ of the protein and $\frac{1}{4}$ of the minerals. The alfalfa supplements the corn exactly because, while it provides only $\frac{1}{3}$ of the carbohydrates and fat, it does provide the necessary $\frac{5}{8}$ of the protein and $\frac{3}{4}$ of the minerals.

The protein forms only a small part of the ration, about 13 per cent, but it is absolutely essential in making milk. The big bulk of carbohydrates cannot make up for any lack of protein. If the protein is $\frac{1}{3}$ short, a third of all the carbohydrates and fat is wasted and there is a much greater reduction in the milk. A good cow cannot eat enough clover hay to supply the protein, but the 12 pounds of alfalfa supply it perfectly. The minerals form only a small per cent of the ration, but the cow cannot thrive and produce milk without them.

Alfalfa hay (or its equivalent in sweet clover pasture during the summer) is the only farm crop that, when fed with corn as above, can supply the protein and minerals for maintaining the cow and making milk as indicated here, and the higher the production the more necessary the protein and minerals in the right proportion. Alfalfa also has the other exact qualities required; it is appetizing and palatable.

For all these reasons, together with its great yield and economy of production, alfalfa is the premier companion crop for corn in economic, profitable dairy production. And the right quantity of alfalfa is produced on an acreage nearly equal to that of the corn.

It must not be inferred that one can feed poor alfalfa hay with corn and get such results. There is absolutely no question that alfalfa cured in the swath or in any manner where the leaves are largely lost, cuts down the production of high-producing cows unless high priced concentrates rich in protein are fed.

Alfalfa Fully Earns Distinctive Title.

In all these details and in the varied practical experience of six years in this Milk Per Acre test, alfalfa fairly earns its title as the one and only full companion crop for corn in dairy farming. Not only in theory and in technical analysis of its content but in the yield, economy, actual results, and plain common sense of the case, alfalfa is the finest, fittingest, and most complete companion crop to corn. We have had untold loss in milk production and waste of the corn fed because we did not provide the alfalfa, or we have simply given away twice the cost of raising alfalfa in buying its protein equivalent in commercial feeds. Is it not time that we justly recognize this companion crop and welcome it to equal rank and acreage with corn for the cows?

Timothy As a Feed.

One after another the different factors of the Milk Per Acre demonstration at the University of Illinois have been dwelt upon in tracing cause to effect. But there is another angle from which to view it, another measure to take of it, before it is possible to see how the change from one kind of hay crop to another in the field, from one hay to another in the ration, can make such a difference in production. The result seems out of all proportion to the cause and unbelievable unless we trace it through the mill in making milk. Plenty of alfalfa was grown and fed in this demonstration and but little or no alfalfa, but little or no legumes of any kind, are grown on thousands of dairy farms.

The 1,200-pound cows in this demonstration were fed an average ration of about 38 pounds silage, 15 pounds alfalfa hay, and 1 pound corn meal for the six years. But it seems best here to talk of a ration that fits the average-sized cow. The above daily feed is practically equivalent to 35 pounds of corn silage, 12 pounds of alfalfa hay, 3 pounds of corn meal, and 2 pounds of ground oats, which is the requirement for a cow weighing 1,000 pounds and producing 25 pounds of 4 per cent milk or 8,250 pounds per year.

This ration contains 2.05 pounds of digestible protein, 14.2 pounds of carbohydrates and fat. Of this the cow will use .7 of a pound of protein and 7.2 pounds of carbohydrates and fat for maintenance, and the remainder is available for making milk.

Now if timothy were grown on that farm instead of alfalfa, and if the ration fed were changed in just that one item, substituting 10 pounds of timothy hay—all the cow would eat of this less palatable roughage — for the 12 pounds of alfalfa, she would get practically as much carbohydrates and fat but only half as much protein with the timothy ration as with the alfalfa ration. For her maintenance, the cow would take the same kind and amount of nutrients from the timothy hay ration as from the alfalfa ration, and leave only enough to make an average of 7 pounds of 4 per cent milk per day—2,310 pounds for the year. This reduces her production 72 per cent, takes out more than all the profit, and makes such dairying a farce—or a tragedy.

This loss is so startling that we can hardly comprehend it, and we must turn to reliable evidence to see to what extent timothy hay is provided on dairy farms instead of alfalfa or other legumes.

The 1920 census shows that of the improved land in the United States, 4.1 per cent is in timothy and only 1.75 per cent is devoted to the growing of alfalfa. In Illinois there are 16½ times as many acres devoted to growing timothy as alfalfa.

In 1912 a survey of 680 dairy farms in the most intensive dairy section of Northern Illinois comprising seven townships, showed that on 71 per cent of these farms timothy was the only kind of hay grown; on another 16 per cent of the farms over two-thirds of the hay acreage was timothy; and on only 6 per cent of these farms was the timothy acreage less than one-third of the total hay acreage. As the timothy acreage decreased the labor income of these farms increased from \$466 to \$960—more than 100 per cent. According to the census figures for 1910 and 1920 timothy has decreased and alfalfa and clover has increased

somewhat, but the conditions as to the relative acreage of these crops is still deplorable.

In the five intensive dairy counties of northeastern Illinois 10 per cent of the tillable land is devoted to timothy while only 1.6 per cent is in alfalfa. The total of alfalfa and clover acreage is only 4.2 per cent in the United States against 4.1 per cent in timothy. In Illinois there is 3.7 per cent of these two crops as compared to 5.3 per cent in timothy, and in the five dairy counties in Northern Illinois there is 6.3 per cent in alfalfa and clover and 10 per cent in timothy.

From data taken recently while visiting twenty-six places selected as being among the best special dairy farms in the northern part of Illinois, four farms, or 15 per cent, had no other hay than timothy, and yet these farms averaged 21 cows giving milk; only half the farms had any alfalfa; and the total acreage of legumes on 14 farms had less than 10 per cent of their area, instead of 40 per cent, the needed amount on dairy farms.

A Heavy Needless Expense.

But many dairymen may say, "We don't feed any such poor ration as you make out. We buy protein feeds, bran, oil meal, etc., and give the cows a good ration." Yes, it is very common practice to buy protein concentrates to balance the ration. These feeds are bought by the ton and by the carload, and often cost the dairyman \$400 to \$1,000 a year. But why purchase the protein? Why deliberately move so large a portion of the year's receipts across the ledger page from an income to an expense—and sometimes into red ink? If alfalfa had been grown the protein would be in the hay mow. With timothy yielding one and a half tons and alfalfa three and a half tons (as indicated in Part II of this series), it would take 1.94 acres of timothy for every acre of alfalfa to produce the respective rations named. So it takes nearly double the land to produce the timothy—another immense increase in cost, very easily \$200 a year. Buying the protein will do such a ration and the cow a great deal of good but it turns the dairyman's

pocket inside out. It adds a great burden of expense in the endeavor to make up for an unpardonable blunder in wasting land and labor to grow timothy hay. The milk produced per acre is reduced tremendously on farms where timothy is grown, because an acre of timothy is worth only about one-tenth as much as an acre of alfalfa to furnish protein to balance corn. It is not economic dairying. If the dairyman is going to buy his protein, he had better go fishing than to grow timothy hay and then he could have his timothy ground for a watermelon patch bigger than his corn field.

It costs a great deal more to buy the protein than to raise it, but if the dairyman were so liberal and really wanted to pay an extra \$500 or \$600 just for the privilege of amusing himself by handling timothy, he still would not get as high milk production as with alfalfa in the ration. In common practice, the dairyman seldom if ever feeds enough purchased protein with timothy hay to take the place of twelve pounds of alfalfa in the ration and the purchased feed high in protein does not take the place of alfalfa in supplying the necessary minerals.

Buying concentrated protein feed for high producing cows is commended in the strongest terms. No greater waste can be made than not to give the proper amount of such feeds to cows capable of producing a good flow of milk, because they cannot get sufficient protein from alfalfa and corn. But these cases offer no excuse for growing timothy and then buying protein concentrate because protein is lacking in the home-grown feed.

Clear Case in Court.

These are undeniable facts of dairy practice. All the thieves that ever carried property off our farms have not caused a tenth of the damage done by the smooth timothy thief that stays right with us year after year in the guise of friend and helper. The timothy swindle is one of the most gigantic frauds ever perpetrated in dairymdom.

The worthless cow never "laid down on her job" of making milk as completely and extensively as timothy has

cheated the dairyman out of the profits of his labor. We have detected this boarder cow that never pays her bill and for several years have been sending her to the butcher by scores and hundreds. But the timothy thief has deceived us until the present day—deceived the dairyman but not deceived the cow which takes timothy for just what it is, a well dressed but worthless semblance of dairy feed.

Just so long as timothy is grown on the dairy farm, this thief will crouch in the manger and “get away with” more than half the milk, as surely as if the cow kicked the pail over in the gutter.

The cow could have convicted this thief any day but instead she followed her old policy of “saw wood and say nothing;” in chewing timothy she literally saws wood and—gives nothing. But the ration radio has at last picked up her voice and she says in the plainest language, “We must eat what is set before us, but in the name of all good taste and a full milk pail for hard working dairymen, give us the twentieth amendment that shall forever prohibit the manufacture and feeding of timothy hay.” Can any dairyman examine the evidence and pass any other sentence?

Clover and Timothy.

Many dairymen discerned the timothy folly, as the grosser transgression always betrays itself, and many dairymen had begun to suspect that coarse pretender of large default in delivering the goods that would supplement corn in making milk. But when timothy got into partnership with clover, a legume with a good name, clover and timothy didn't seem so bad. It was received in the best dairy circles as a fair substitute for the rich legume the dairymen would like to feed. For many who had repeated difficulty in getting a good stand of clover, this mixed hay was a welcome compromise, and it has come to be very generally and unquestionably accepted. To be sure, it often happens with the mixed hay as with the “rabbit” sausage of the Paris butcher, which he had to admit contained some horse meat; when pressed for the truth, it was “50-50;” and asked to explain still more in detail, it was “one rabbit to one



Corn Produced an Average of 11½ Tons of Fine Rich Silage for Six Years.

The corn ground was prepared and planted in the ordinary way. The corn was cared for with a double row cultivator, cut with a corn binder and put in the silo in the ordinary way to save as much labor as possible.

horse." Clover and timothy are often mixed on the same principle, one rabbit of clover to one horse of timothy.

We have not come to the end of the farm applications in this Milk Per Acre series until we see how the popular clover and timothy hay compares with alfalfa in the cow's ration.

Daily Requirements of a Cow Weighing 1,000 Lbs. and Producing 25 Pounds of 4% Milk.

	Digestible Nutrients in Pounds		
	Protein	Carbohydrates	Fat
Maintenance .....	.7	7.	.1
For 25 lbs. 4% milk	1.35	6.	.52
Total	2.05	13.	.62

An Economical Standard Ration That Meets the Above Requirements.

	Protein	Carbohydrates	Fat
35 lbs. corn silage .....	.39	5.25	.25
12 lbs. alfalfa hay	1.27	4.68	.11
3 lbs. corn meal .....	.21	1.90	.13
2 bls. ground oats .....	.19	1.04	.08
Total	2.06	12.87	.57

This ration for the 1,000-pound cow is the practical equivalent of the ration fed to the 1,200-pound cows for six years in this demonstration.

By simply changing the 12 pounds of alfalfa of the above standard ration to 11 pounds of the mixed hay, half clover and half timothy—for that is all the cows would eat of it—and leaving the remainder of the ration exactly the same, we have the following:

Common and Popular Dairy Farm Ration.

	Digestible Nutrients in Pounds		
	Protein	Carbohydrates	Fat
35 lbs. corn silage .....	.39	5.25	.25
5½ lbs. clover hay .....	.42	2.16	.10
5½ lbs. timothy hay .....	.17	2.35	.07
3 lbs. corn meal .....	.21	1.90	.13
2 lbs. ground oats .....	.19	1.04	.08
Total	1.38	12.70	.63

Which Reduces the Milk One-half.

	Protein	Carbohydrates	Fat
Same maintenance .....	.7	7.	.1
For 12½ lbs. 4% milk .....	.68	3.	.26
Total	1.38	10.	.36

The lack of protein would be the limiting factor in the clover and timothy ration and would cause milk production to be decreased from 25 pounds of 4 per cent milk per day to $12\frac{1}{2}$ pounds—a reduction of 50 per cent. For the maintenance of her body the cow requires the same amount of each nutrient with either ration; the abundance of carbohydrates and fat cannot take the place of protein; so any reduction in protein acts directly to decrease the milk flow, and in this case there is only protein enough above maintenance to make $12\frac{1}{2}$ pounds of 4 per cent milk. The extra carbohydrates and fat in the feed are as truly wasted as if they were dumped into the gutter and slushed out with the manure. The production of milk is cut right in two in the middle by feeding clover and timothy hay in place of alfalfa hay. Half the milk is gone, although every other factor of feed and care is sufficient for the full 25 pounds a day.

To estimate what that difference in rations and loss in milk means as a total for the state or larger area, we must inquire how generally the clover and timothy ration is used for dairy cows; and its use is indicated by the relative acreages of these different hay crops grown.

Mixed Hay and Alfalfa 10 to 1.

The 1920 census shows that in the seven states—Ohio, Indiana, Michigan, Wisconsin, Iowa, Missouri and Illinois—which comprise the most productive region in the country, only one-half of one per cent of the improved land is in alfalfa. For every hundred acres of improved land in this region, but one-half an acre is in alfalfa and 7.8 acres are growing clover and timothy.

In Illinois there is just one-third of an acre out of every hundred of improved land in alfalfa and nearly ten times this amount in clover and timothy.

In the five intensive dairy counties of northeastern Illinois—Cook, Lake, McHenry, Kane and DuPage—there are but 1.6 acres out of every hundred of improved land in alfalfa and 7 acres in clover and timothy.

So the mixed hay acreage is fifteen times the alfalfa

acreage in the seven states named above, nearly ten times the alfalfa in Illinois, and 4.3 times the alfalfa in the five dairy counties named.

If the clover area were added in with the alfalfa (because it is a legume and partly as efficient as alfalfa), the mixed hay as compared to alfalfa and clover would still occupy 4 times as many acres in the seven states named above, 1.4 times as many in Illinois, and 2.5 times as many in the five dairy counties of northeastern Illinois; and this takes no account of the large acreage of pure timothy raised.

In traveling over the United States west to the Rockies, east to New England, and north to northern Michigan and Wisconsin, right through the states named, the lack of alfalfa and clover on the farms and the crying need for these crops by both the live stock and the land is amazing to the observer.

Survey of Best Dairy Farms.

From the general data of the census we may turn to the strictly dairy farms. Twenty-six places selected as among the best special dairy farms in the northern part of Illinois were visited recently, and the following items taken from their survey show how small a place is given to alfalfa in their hay acreage. The farms averaged 158 acres in size and the average number of cows kept was 34.

Four of these farms (15 per cent) had no other hay than timothy. Twenty-one farms (81 per cent) grew timothy averaging 7.5 acres, or 4.7 per cent of the farm area.

Thirteen farms, only half of all, raised some alfalfa, averaging 6.1 acres, or 3.39 per cent of the farms and less of it per farm than timothy; only three farms had as much as 10 per cent of alfalfa.

Nineteen farms grew clover, averaging 8.7 acres, or 5.5 per cent of the land. More farms had clover than had alfalfa and a higher per cent of clover. Fourteen farms, more than half, had less than 10 per cent of the land in clover and alfalfa combined—legumes over the farm only once in 10 years. Only four farms grew 15 to 20 per cent of legumes.

These 26 dairy farms, representing the best, are growing only one-third enough alfalfa to supply during the winter the cows kept on them. Only seven of the farms had enough legumes for the cows; 73 per cent came short.

The Greatest Opportunity for Advancement.

All this data clearly indicate that the most backward feature today on the dairy farms of America is the lack of alfalfa and clover. And the greatest necessity and opportunity for advancement today is to grow ten times more alfalfa. It was done to good effect and proved thoroughly practical through all the variations of six years in the Milk Per Acre demonstration sketched in this series.

Cows Make Money Chewing Alfalfa. Profits are 34 to 1.

Doubling the cow's production for the winter feeding period by simply growing the right crops and feeding the better ration—and doing it by practical and economic farm methods via the alfalfa route—seems well worth our study and effort. But in the light of the profits in the business, it takes on much higher meaning. Illinois Circular No. 134 contains a table for computing the profit and loss of cows when their production is known. It is an approximately correct index today for cows kept under ordinary farm conditions, and it shows a six months' profit of \$21.25 for the alfalfa-fed cows producing 25 pounds milk per day, and a six months' profit of \$.62½ for the clover-and-timothy-fed cow producing 12½ pounds of milk per day. To make the same amount of profit during this winter feeding period and with the same quality of cows, a farmer feeding the clover and timothy ration would have to keep 34 times as many cows as the farmer feeding the alfalfa ration. A herd of 25 cows fed the ration containing the alfalfa would make exactly as much profit as would a herd of 850 cows fed the ration where the hay was clover and timothy.

The man who fed the ration containing the clover and timothy would need 34 times as many acres of corn and oats as the man feeding the ration containing the alfalfa because he would need 34 times as many cows.

To grow the hay for the barn feeding period would require for the herd fed alfalfa hay .31 of an acre of land per cow or $7\frac{1}{4}$ acres for a herd of 25 cows. But to produce the hay for 850 cows fed clover and timothy, would require .57 of an acre of land per cow or 485 acres—over 62 times as much land in hay.

A man with the small herd would have to grow only $7\frac{1}{4}$ acres of alfalfa while the man with the large herd must raise 485 acres of clover and timothy. The latter man would certainly have some large job of haying, many, many times more than would the man with the 25 cows. The question of taking the extra time and pains necessary to cure the $7\frac{1}{4}$ acres of alfalfa to make a high quality hay by putting in cocks under caps and thus preserve its leaves and keep it from bleaching pales into insignificance by the side of the other job of haying.

To grow the entire feed for the barn feeding period would need for the alfalfa fed herd only .97 of an acre per cow or $24\frac{1}{2}$ acres for the herd of 25 cows. But to produce the feed for the same length of time for the clover and timothy fed herd would require 1.23 acres of crops per cow or 1,045 acres for the 850 cows. Thus 43 times as much land would have to be farmed to produce the winter ration alone, saying nothing of the increased amount of barn room, equipment and labor that would be needed.

The graphical illustration shows the respective numbers of good cows of exactly the same efficiency a man would have to keep to make the same amount of profit for the winter period, \$531, according to whether he grew $7\frac{1}{4}$ acres of alfalfa or 485 acres of clover and timothy to balance the corn ration

Sweet Clover Supreme.

Is there an efficient pasture crop that will give the advantage to the summer ration that alfalfa hay gives to the winter ration? Fortunately we have exactly that kind of crop in sweet clover, as rich in protein as alfalfa, as high in yield, much cheaper to produce than alfalfa hay, and that will furnish entirely suitable cow pasture for a much longer

period than blue grass. If the merits of sweet clover had been known at the time, it would have been used in the Milk Per Acre demonstration at the University of Illinois. But now on many dairy farms, sweet clover is proving the full sister and summer substitute of alfalfa. So the efficiency of the legume ration is not limited to the winter feeding of alfalfa, but it may be extended throughout the full year to an equal or greater advantage by use of sweet clover pasture.

Sweet Clover Experience on 32 Farms.

To find the results from farm experience in pasturing sweet clover, a questionnaire was sent, and the replies from thirty-two dairymen in different parts of Illinois show the following facts:

In general the evidence was very strong and enthusiastic in favor of sweet clover. Twenty-nine out of 31 answers said that sweet clover did not impart a bad flavor to the milk; two spoke of slight trouble.

"Did you experience any difficulty with bloat?" Of the 32 answers, 28 were "no," two had a trifle of bloat, and two dairymen each lost one cow by bloat, but admitted it was their own fault because they turned the cows on hungry and when the clover was wet with dew.

SWEET CLOVER PASTURE SAVES LAND AND LABOR.

Sweet clover pasture saves about one-fourth of the year's labor on a dairy farm over feeding corn silage and alfalfa, besides giving the cows six months of pasture freedom with all its benefits from exercise in the open.

Sweet clover embodies all of the total yield of nutrients in minerals and appetizing and toning-up effects attributed to alfalfa.

Lack of legumes is the low factor in American agriculture today, and the easiest way to increase the profits from dairy farms is to grow more alfalfa and sweet clover. It is the most natural and practical way of benefiting both the live stock and the soil.

Fourteen farmers reported experience in pasturing cows on sweet clover the first fall, after it was sown in small grain in the spring. They had 170 acres of sweet clover or an average of 12 acres per farm. It pastured 271 cows (or cow equivalents in other stock), or 1.6 cows per acre for an

average period of 1.7 months; 63 of an acre supported a cow during this time.

Twenty-one farmers reported on pasturing sweet clover the second year. Upon 266 acres, or an average of 13 acres per farm, they pastured 388 cows or 1.46 head per acre for an average period of 3.9 months; .69 of an acre supported a cow.

When sweet clover was sown with small grain in the spring and pastured that fall and the following year, the one seeding of sweet clover furnished pasture for the cows for an average of 5.6 months. The 21 farmers turned out on an average April 29. They took the cows off on the average August 26 (3.9 months). By this time the growth of new clover in the stubble would be large enough to turn upon and it would carry the cows for 1.7 months. Thus the old and new crops would give a total of 5.6 months pasture in one season. These reports show that less than three-fourths of an acre of sweet clover was required to pasture a cow 5.6 months.

The milk flow was well maintained in nearly every case and increased in many with only a small amount of other feed given in a few cases.

From this data and the writer's own experience, it seems conservative to say that seven-eighths of an acre of sweet clover, including the fall pasture the first year sown, will support a cow six months.

In addition to the above, seven men reported on pasturing first year sweet clover sown alone: 53.5 acres pasturing 76 cows, or 1.4 head per acre for an average period of 3.5 months. But as this manner of seeding displaces another crop the first year, it is not economical and cannot be recommended under ordinary circumstances.

The best way to keep a continuous supply of sweet clover pasture is to seed it each year in small grain because the sweet clover in the stubble makes an excellent pasture for two months in the fall. The second year crop makes excellent pasture for four months the following year, starting early in the spring. When the second year pasture is

short the last of August, the first year's crop is just ready to turn onto.

The following are a few of the significant remarks by men who have pastured sweet clover with dairy cows:

"My stock will leave anything for sweet clover."

"Sweet clover is about three times as good as blue grass for pasture. I had good green feed all summer and the hot, dry weather did not affect it. A great many neighbors who gave me the laugh last spring for sowing weeds are going to try it this year. I laughed several times in the fall when I compared the blue grass fed to stock to the sweet clover fed animals."

"I have about half the acreage of sweet clover that I did of blue grass and about two months more of pasture, that is, during July and August."

"When cows were taken off a fairly good blue grass pasture in September, the milk flow increased as much as ten pounds per cow after being on the sweet clover three days."

"I have had dairy cows on sweet clover for eight years and find it to be one of the best pastures. In 1922 each cow gained from 8 to 18 pounds in milk flow when turned on sweet clover pasture in the spring. One cow gave 69 pounds per day in two milkings without grain or other feed."

Essentials of Sweet Clover Management.

Many farmers pasturing sweet clover do not turn out soon enough in the spring to keep it down. It should not be allowed to get more than four or five inches high before commencing to pasture. If it is not stocked enough to keep it down after this, it will get too large and woody and some of the plants will go to seed and quit growing. Sweet clover should be allowed to get well above the stubble the first fall before the cows are turned on, and it should not be pastured close late the first fall because the plants should be allowed a chance to store up nutriment in the roots so as to make a strong growth early in the spring of the second year.

If the soil is acid, it must be limed or sweet clover can-

not be grown successfully. Five pounds of seed per acre is sufficient to get a good stand where the soil conditions are right, but a ton of seed to the acre will not produce a stand if the soil is acid.

Best Hand on the Farm.

The sweet clover amendment to the Milk Per Acre demonstration is gladly accepted from more recent farm practice. Sweet clover is simply summer alfalfa, extending all the advantages of alfalfa and "then some" through six months of pasture. Like alfalfa, sweet clover is a legume supplying a still greater quantity of protein and minerals per acre. Everything that has been said for alfalfa may be said for sweet clover, but that is not all.

Good farm help is getting more and more difficult to obtain and there is much labor in plowing and preparing the ground, raising the corn crop, filling the silo, making alfalfa hay, feeding these crops to cows, and hauling out the manure.

If every dairy farmer could find a friend who would do all of this work on that half of the yearly crop which is fed during the summer six months and, in addition, feed the cows exceptionally well during the summer—do all this work for nothing and board himself, and not reduce the milk flow—every dairyman would think such a one a friend indeed.

The facts are that every dairyman—north, south, east, or west—has such a friend ready to work for him, and this friend is nothing more or less than what most farmers for two generations have considered a troublesome weed — sweet clover.

Would Not Increase the Acreage.

This is no mere sentiment or theory. The corn and alfalfa acreage may be reduced as much or more than that required for the sweet clover. Since it took 1.92 acres of land to support a cow a year on the Milk Per Acre demonstration, it would take only .96 of an acre of corn silage and

alfalfa hay to support a cow for the summer six months. Since it takes less than .75 of an acre of sweet clover pasture (including both years) to support a cow six months, there would still be a fifth of an acre on which to grow feed to supplement the pasture. This would furnish about four times the amount of corn meal per cow per day that was fed on the twenty acres. So, without increasing the acreage, enough emergency feed, either corn or alfalfa or both, could be grown. It is doubtless best to allow seven-eighths of an acre of sweet clover pasture per cow so as to have an abundant supply of sweet clover and then little grain feed will be necessary.

A Great Saving of Labor.

The average cost of producing corn and putting it into the silo last year was \$22.75 per acre. The cost of putting up alfalfa hay was \$12.40 and if it were done properly with caps, it would certainly increase the cost to \$15.00. The average expense for growing and putting up corn silage and alfalfa hay would be \$18.87 per acre. But in comparison, the sweet clover costs nothing for harvesting, the seed cost per acre is small, it is seeded with the regular small grain crop, and it saves all the labor of feeding.



"HOW CAN I MAKE MORE MONEY FROM MY HERD?"

**A Digest of the Experiences and Recommendations of
Official Testers of Cow Testing Associations in Charge
of 102,000 Cows from 6,251 Herds in 35 States;
Breed Associations, Etc. Also Extracts from
Bulletins of U. S. Dept. of Agriculture
and State Agricultural Colleges.**

Prepared by Research Department, National Association of
Farm Equipment Manufacturers, Chicago.

Sweeping and far reaching changes are taking place in the dairy industry of the entire world. The American dairy cow has stood as steadily as the gold standard during the post-war deflation that has shaken the farming industries of the world to their foundations.

Today, we are faced with the facts that every dairy nation is straining every nerve to gain added advantages in the markets of the world, and those nations heretofore not considered dairy nations are increasing their dairying very materially.

At home, the American producer suddenly awakens from his sense of security behind his high tariff walls and discovers that no longer does it protect him because production has arisen above consumption and our dairy business goes to an export basis in competition with the products of the high-producing cows of Holland, Denmark, Sweden, Germany and Great Britain on the one hand and the cheaper-fed cows of New Zealand, Australia, Canada and the Argentine on the other.

Our dairy farmers are faced with the necessity of cutting the overhead on a pound of butterfat. The answer is simple, according to the men in charge of dairying in the U. S. Department of Agriculture, the Cow Testing Associa-

tion work and the agricultural colleges. It can be done quickest and surest through—

1—Cheaper feed.

2—Less man labor per cow.

3—Greater per cow production.

Cheaper feed demands are being answered by the silo, the growing of more protein roughages, like alfalfa, soy beans, sweet clover, etc., and by home grinding and mixing of feeds.

The first fundamental in American farming is replacing man labor by machine labor. The rise of the American farmer from the peonage of past ages, such as prevailed through the centuries until but a few decades ago, is due primarily to the introduction of machine methods to farming. Dairying was the greatest of all farming drudgeries but a few years ago before modern sanitary labor-saving equipment was introduced. Feed and litter carriers instead of the wheelbarrow; gas engines and individual drinking cups instead of pumping water by hand; cream separators instead of crock setting and unsanitary finger skimming; milking machines instead of hand milking; gas engines and tractor running the feed grinders, the ensilage cutters, the milking machines and cream separators, the water pumps, and the regular farm field work. All these are direct man labor-savers that cut the cost of milk production hundreds of millions of dollars annually. They guarantee dairy profits to the farmer and his family without a form of slavery that drives the young folks from the farm.

The increasing of the per-cow production, so that twelve cows will make more money than 40 now do for many farmers, is most quickly arrived at through the great movement called "Cow Testing Associations," backed by the U. S. Department of Agriculture, the State Colleges of Agriculture, and the local Farm Bureaus. Not only does this system immediately find the cows not paying for their keep, so that they may be sent to the butcher, but the testers teach better feeding, so that cows not getting a square deal are given an opportunity to show what they can produce before being sold off as "boarders." Any farmer not in a

Cow Testing Association should help organize one through his local Farm Bureau and then he should follow the tester's instructions for getting at bigger profits. Above all, he should stick with the association and keep increasing his herd's average annual production.

To give farmers an idea of the meaning of modern time and labor-saving equipment in putting their dairy herds on a basis of greater profit through cheaper feeding, testing and cutting out man-labor costs, the Research Department of the National Association of Farm Equipment Manufacturers has surveyed the 732 Cow Testing Associations, the herds of the Wisconsin Registry of Production cows, the Indiana 300-Pound cows, the Holstein-Friesian Association of America's 1000-pound butterfat producers, as well as those of the American Jersey Cattle Club, and the American Guernsey Cattle Club Advanced Registry herds. The following table tells the story of labor and feed saving in American dairy herds from the "average farmer's" herd with which the Cow Testing Association begins, up to the highest producing herds in the world of dairying:

	Holstein- Friesian Assn. 1,000 lb.	American Guernsey Cattle Club "A. R."	Wis. "R. O. P."	Cow Testing Assns.
Cows	140	2133	748	102,830
Herds	22	51	36	6,193
*Silos	313 %	190 %	155 %	81 %
Cutters	123 %	76½ %	72 %	32 %
Stanchions	100 %	92 %	81 %	21 %
Cups	86 %	82 %	78 %	19 %
Carriers	73 %	63 %	14 %	5 %
Ventilation	68 %	69 %	50 %	6.6 %
Tractors	200 %	76½ %	50 %	34 %
Gas Engines	168 %	90 %	125 %	72 %

*Percentages of herds equipped with silos, ensilage cutters, swinging stanchions, drinking cups, feed carriers, ventilation systems, tractors and gas engines are given in all cases for the herds as reported by the official testers.

Quality Cows Pay.

Dr. David Friday, formerly president of the Michigan State Agricultural College, recently pointed out a fact that we all know but seldom stop to realize, namely, that the

scrub dairy man might get 120,000 pounds of milk in a year from 40 cows, or an average of 3,000 pounds each, while he could get the same size milk check from 30 cows producing 4,000 pounds each, or from 15 cows producing 8,000 pounds each, or from 12 cows producing 10,000 pounds each.

Bearing this fact in mind, the U. S. Dairy Division has recently completed work which shows that cows producing 100 pounds fat in a year returned over cost of feed, \$10.00 apiece. Cows producing 400 pounds fat in a year gave an average of \$106.00 above cost of feed. In other words, **the cows had to produce only four times as much butterfat to become over ten times more profitable!** To double the net profit of a poor cows requires but a slight increase in fat production.

From these figures it is easily seen that with twelve good cows the income above feed cost is just as great as with forty poor cows and the labor involved in taking care of them is about one-fourth of that of the larger herd. The dairy business is not any different from any other businesses in many respects.—H. R. Lascelles, Report of Colorado CTAs.

10% Found Unprofitable by C. T. A.

The cow testing work here in Wisconsin has not been so popular during the last few months largely because feed prices have been so high and the prices paid for dairy products have been low. Of course that is the very time when farmers should join, but they are hesitating instead. I believe this is the time for us to do more close culling of our herds and eliminating of cows that cannot make at least 200 lbs. of butterfat. Our herd averages should be at least around 300 lbs. The several thousand cows producing under 200 lbs. of fat in this state if put on the block would raise the price of milk considerably here in this state. We have found as many as 10% of our cows unprofitable in C. T. A. work. If 10% of the cows in Wisconsin were disposed of, it would mean over 2,000 would go to the block and I believe there are fully as many here.

Every farmer should have a set of drinking cups in his

barn for his cows. We have found in several instances where the herds showed an increased production in milk of from 10 to 14% without changing the grain ration and roughages fed after the drinking cups were installed. Every farmer should have a store house for winter feed.

Without a silo he cannot bring about economical production. I believe that a 20-cow herd can pay for a silo in two years through increased production in milk. I do not know of any tendency growing in this state to stop building silos, because of the high labor cost in filling them or because of the high value of alfalfa or other legumes. There is no better roughage combination for the dairy herd than alfalfa and silage.—A. J. Cramer, Dairy Husbandman, Wis. Dairymen's Assn., co-operating with Wis. College of Arts & Dairy Division, U. S. Dept. of Ag.

Washington Tests 10,000.

Those of us who are doing the dairy work in the Extension Service of the State College are doing whatever we can to assist the dairymen in securing modern equipment.

We have about 10,000 cows in 10 associations. It seems to me that we must use just as good methods as are used by dairymen in foreign countries if we are to compete with them in the dairy markets of the world. If the Danish and the Dutch continue to use the Cow Testing Associations as efficiently as they have been using them, it will be necessary for us to do likewise, in order to compete.

It seems to me that it is quite practical to put every cow through the Cow Testing Association. The Cow Testing Associations in this state are organized in such a manner that a man with five cows can test as easily as the man with 50 cows.—Don G. Magruder, Extension Specialist in Dairying, The State College of Washington.

Wisconsin Cow Testing Association Facts.

Wisconsin has 168 Cow Testing Associations with 76,100 cows on test. These are owned by 4,471 members. The average association has 27 herds and 453 cows and an average of 17 cows to the herd. Fifty out of the 71 counties

in the state now have one or more associations. Clark County leads the list with ten associations.

Since the first cow testing association was started by the Wisconsin Dairymen's Association in 1906, over 500,000 cows have been placed on yearly test for 33,000 farmers in 1,143 regularly organized cow testing associations.

There were 100 associations reporting on the year's production. More than 49,000 cows in 2,943 herds averaged 7,106 pounds milk, 3.84% fat, and 273.2 pounds of butterfat. The average cow the country over is credited with 160 pounds fat and the average Wisconsin cow with 190 pounds fat.

18 C. T. Assns. Average 300 Lbs.—Eighteen associations report an average yearly production per cow of 300 pounds fat, the Richfield association with 350 cows heading the list with an average 9,849 pounds milk containing 341 pounds fat.

There were 535 herds in 61 associations reported with an average of over 300 pounds fat a year; or 18% of all herds. Twenty-five associations report one or more herds with a yearly herd average of over 400 pounds fat.

Last year 5,542 cows were sold to the butcher as unprofitable, or 10%. There were 3,714 cows sold for dairy purposes, and 582 purebred bulls were sold on the basis of the cow testing association records of their dams. Advanced Registry testing is done by 98 members in 68 associations.

During the year 1,710 herds out of 3,429 were tested for tuberculosis, 1,325 of which showed no reaction. There were 1,304 cow testing association herds on the State and Federal Accredited list as free of T. B. or 39% of the 3,375 herds on which a report was made.

Cows Are Well Fed—Cows on pasture were fed grain in 1,310 herds and silage in 732 herds. There were 2,363 members who grew Alfalfa as compared with 776 who grew Timothy hay. Soybeans for hay was grown by 552 and for grain by 152. Commercial mixed feed was purchased by 1,482 members with 832 buying feed co-opera-

tively at an estimated saving of \$15,328.00. Grain was fed to dry cows by 2,190 members, or 60% of those reporting.

Farms Well Equipped—The following equipment was found on 4,000 farms of members:

3,743 members owned 4,591 silos; 1,856 had milk houses; 552 had ice houses. There were 1,884 whitewashed barns; 1,007 milking machines; 2,600 had drinking cup systems; 2,775 had steel stalls; 1,191 had electric lights; 3,723 had autos; 675 trucks, and 1,289 tractors.

There are: 1,267 ventilation systems in use in 134 C. T. A.'s reporting. 388 Separators found inefficient in 106 C. T. A.'s reporting. 662 members have bathrooms and equipments in 130 C. T. A.'s. 1,158 members have power washing machines in 126 C. T. A.'s. 642 members have electric or ironing machines in 106 C. T. A.'s. 93 members have pressure cookers in 29 C. T. A.'s reporting. 288 members installed drinking cups last year in 107 C. T. A.'s. 80 members installed barn ventilation systems in 46 C. T. A.'s. 206 members installed Steel Stanchions last year in 85 C. T. A.'s. 167 members installed Milking Machines last year in 86 C. T. A.'s. 299 members built silos last year in 88 C. T. A.'s reporting. 73 members built milk houses last year in 50 C. T. A.'s reporting. 3,723 members who have cars in 133 C. T. A.'s reporting. 67 members built new barns last year in 49 C. T. A.'s reporting. 247 members who have radio sets in 109 C. T. A.'s reporting. 1,069 members who have running water in 133 C. T. A.'s reporting. 1,394 members who have furnaces in 134 C. T. A.'s reporting.

Waukesha, Wis., Greatest "Cow County."

There are 3,020 farmers in this county. Most of the farms are small, as 18% range from 20 to 49 acres, 38% from 50 to 99 acres, and 29% from 100 to 174 acres. Less than one-half dozen farms are larger than 400 acres. The largest individual farm consists of 1,100 acres. Eighty-three per cent of all farms are operated by the owners.

The sale of dairy products amounts to approximately \$5,500,000 a year. In addition to this, over \$500,000 worth

of dairy cattle are sold out of the county each year. This makes a total of \$6,000,000 from the dairy each year.

The average production of Waukesha cows is close to 6,000 pounds of milk, while the state average is only 5,000 pounds. Cow testing association records show that there are a large number of herds that will produce over the 6,000 pound mark; in fact, 14 out of 26 members in one association averaged over 300 pounds of fat in 1923 which would mean nearly 8,000 pounds of milk.

Many other things might be mentioned, but it suffices to say that dairying has developed to such an extent that it takes 21 banks to handle the farmers' money. In 1890 there were only three banks in the county, and in 1900 the number had increased to five. In 1910 there were 11 and in 1923 there were 21 banks. The deposits have increased from \$5,681,000 in 1910 to \$12,405,000 in 1920 and \$12,540,000 in 1923. The value of dairy products has likewise doubled from 1910 to 1923. The dairy cow has made it possible to build good roads, there being 162 miles of concrete road in that county. More than 4,000 automobiles are owned by people in rural district. Fifty per cent of the people live on the farms, yet they own over half the automobiles of the county as the total number of autos is 6,923. These same farmers own more than 1,200 trucks and 702 tractors.—County Agent, Waukesha County, Wis.

Owatonna, 146 to 255 Lbs. "B. F." in 2 Years!

Very accurate records have been kept in 22 farms in the vicinity of Owatonna, in Steele County, Minnesota, for the past five years. Most of these farmers are members of the cow testing associations. Guy Adams has a modern dairy barn, about eight acres of alfalfa, a milking machine, a silo and an electric light plant, and here are some of the figures on returns from cows: In 1923, he got 255 pounds of butterfat from the same cows that the year before gave him 218 and the year before that 146. He attributes the gain to better feeding as a result of planting alfalfa, which he uses for hay, and to drinking cups which he has installed

for watering his cows. The average number of hours of man labor employed per cow by the 22 farms is 149½.

Of course, some of the others have milking machines too, but Mr. Adams' number of hours of labor per cow was 137, which is 12 hours less per cow than the average.—Geo. W. Kelley, Editor Northwest Farmstead.

Bremer County Leads Iowa.

E. J. Wylam & Son, Plainfield, set a state record for Cow Testing Association herds when his Holstein-Friesians averaged 13,014 pounds of milk and 458.53 pounds of butterfat, breaking both milk and fat records. The Wylam herd is milked by a machine. The next highest herd in the cow testing work in Bremer County was Chester & Sons,' also near Plainfield, which produced 11,961 pounds of milk that yielded 458.38 pounds of butterfat. The Chester herd has not only been milked by machine for the past five years, but the farm is all modernly equipped for the most efficient production that will save time and labor in field work as well as barnyard chores. A tractor speeds up the field work as well as does the belt work like feed grinding, silo filling, etc.

The third highest herd is also an example of efficient management that has installed the latest time and labor savers for cutting milk production overhead. Silos, drinking cups in front of the cows, sanitary steel stanchions and litter carriers, manure spreaders, etc., make milking a comfortable chore that pays bigger and bigger dividends as production per cow rises to a point two and three times what the average cow of the U. S. and Iowa produces.

"While one of the smallest counties in Iowa, we have 23 creameries and a new \$300,000 condensery erected by the Carnation people," says County Agent Offringa. "To put our county on a cow testing basis equal to Holland, where I spent the first 19 years of my life, would require dozens of more associations. We are only started nicely, and must set our mark up to the Dutch and Danish standards to testing before we can hope to equal them in this practical dairy work."

"FEEDS AND FEEDING"

From Henry & Morrison's 18th Edition. (Considered the highest authority in the live stock feeding world).

Air—It is commonly assumed that a ventilation system should be so designed that the carbon dioxide content of the stable air will not often rise above about 0.167% by volume. To maintain this degree of purity there must pass into the stable every 24 hours the following amounts of outside air for each head of stock. For well-fed cows, 82,843 cu. ft.; for horses, 55,379 cu. ft.; for swine, 18,410 cu. ft.; and for sheep, 7,976 cu. ft.

Water—Often the production of good cows is lessened merely because they cannot conveniently get plenty of fresh, pure water. There is no greater folly than this, for feed and labor is expensive, while water is abundant and cheap. Of all the farm animals, dairy cows require the largest amounts of water, due to the fact that it forms 87% of the milk they yield. The amount of water they will drink depends on the yield of milk, and also on the amount of water a head daily, and high producing cows even more. milk require on the average about 100 lbs., or 12.5 gallons of water a head daily, nad high producing cows even more. Eckles found that cows in milk drank four times as much water as when they were dry and farrow.

When cows are fed succulent feeds, they will naturally need less water to drink than when they receive dry feeds exclusively. In trials covering three years Collier found at the New York (Geneva Station) that cows on the average consumed in feed and drink 468 lbs. of water for each 100 lbs. of milk they yielded. Of this, about one-third was in their feed and the rest in the water they drank. At the Iowa Station McCandlish and Gaessler found that cows fed soiling crops and grain in summer consumed about 350 lbs. of water in their feed for each 100 lbs. of milk produced, and in addition drank 200 lbs. making a total of about 550 lbs. water per 100 lbs. of milk. Cows drink more

water when fed a protein-rich ration than when given feeds low in protein, and they require more water in warm weather than in cold weather.

There has been much discussion as to the number of times a day cows should be watered, and as to the advisability of installing automatic watering devices for providing water at all times in the stalls. High-producing animals should have water at least twice a day, and their production will usually be increased if automatic water bowls are installed in the barn so they can have a drink whenever they wish one, just as we do.

FROM OFFICIAL TESTERS' MONTHLY REPORTS

Iowa.

"T. B." Spread by Old Style Stalls.

Grundy County is being tested for tuberculosis and a large number of reactors have been found. One member in this association lost his entire herd of 27 cows. If he had tested a number of years ago, he could have checked the spread of the disease and his loss would not have been so great. His cows had no special stall to stand in each time, which helped to spread the disease rapidly.—Harry Haling (Tester), Marshall Grundy C. T. A., Iowa.

Milking Machines Released Labor.

One member began feeding silage this month. Silage with a little grain maintained his production to nearly the June and July level. Two members have installed milking machines thus releasing more labor for field work. Another member has re-floored his barn with cork brick and repainted the steel equipment so that his barn seems almost like new.—Glen H. Marsh (Tester), Dubuque No. 2 C. T. A., Iowa.

Advices Better Barns.

Throughout the country are a large number of barns that are drafty, dirty and poorly lighted. For the next five months this is going to be the house and home of the animals that produce your food, the milk you and your children drink and the backbone of your winter supplies. If this food they produce is going to be the best, the cleanest and most wholesome, it is advisable to look after that barn right now. Do not wait until next spring and say, "I'll have to make that barn warmer for next year. I lost considerable by having my cows too cold." See to it now that you have plenty of bedding for the winter and where you have a dark, dirty barn, clean it up and put in windows. Of course it will cost something (but if you have cows that it pays to milk, it will increase their flow more than enough to pay for it, and if it will not pay to fix up the barn, get rid of the cows.—Joseph B. Day (Tester), Floyd Co., C. T. A., Iowa.

Stanchion Strangled Best Cow.

The top cow of the November report, strangled herself in a wooden stanchion. One member lost two head this way last year but he has steel stanchions now. The member that installed drinking cups is very well pleased with them.—Harry Haling (Tester, Marshall-Grundy C. T. A.

Monthly Test of Separators, Important.

A monthly test on cream separators is very important as clearly shown by a member who has just taken a vacant place in the association. He had lost during the month of January \$8.32 worth of butterfat, and he stated that his separator was running much better than last summer and fall. So, according to that, if he would have started at the first of the association year, he would have saved enough to pay for association work, also a new separator bowl and would still be making a profit of \$12.34. A poor separator is one of the worst leaks of profit on a dairy farm.—Karl Wiederrecht (Tester), Fayette No. 2 C. T. A.

One member neglected to spray his cows regularly or they would still be among the five leading herds. Several members are making plans to attend the Dairy Cattle Congress.—Ronald Pennie (Tester), Elgin C. T. A.

“Stressing Importance of Drinking Cups.”

Several members have begun feeding their cows individually, according to production of milk and are well satisfied with the results. More of them will try it during December. * * * Just now we are stressing the importance of drinking cups in the dairy barn. One good dairyman says, “They are a paying proposition if you milk cows,” and the other members who have them installed agree with him. Good barns, good care and feeding make dairying profitable as well as pleasant.—C. E. Nelson (Tester), Pocahontas No. 1 Assn.

Minnesota.

“Hold-up Separators” Caught.

The holdup separator that was stealing \$192 per year from its owner in November tried his old tricks in January, but thanks to the Cow Testing Association it was able to get away with only \$4.08 for January or \$48.96 for the year. Needless to say that the owner of this machine is more than glad that he is a member of a cow testing association. Three other machines were found losing quite heavily for their owners. One member installed drinking cups during January.—F. A. Myers (Tester, Wabasha-Winona C. T. A.

One member has installed a milking machine and six different separators that were showing losses were adjusted so that they are now skimming clean.—M. L. Clough, (Tester), Brown Co. No. 1, C. T. A.

South Dakota.

A separator owned by one of the new members was found which tested .6 of 1% making a loss of 2.47 pounds of butterfat per day or 75.5 pounds per month. With butterfat valued at 39 cents this makes a loss of \$29.44 per month. The actual value of his butterfat was \$164.21, tak-

ing \$29.44 away leaves him only \$134.77. This man replaced his separator with a new machine.—J. Harold Forby, Brookings C. T. A., S. D.

Arthur Heeren has installed steel stalls making the barn more comfortable for the cows as many a cow's udder has been ruined by being stepped on by another cow.—Albert J. Amberg (Tester), Lake & North Minnehaha C. T. A., S. D.

EQUIPPING MINNESOTA C. T. A.

Five cows in the Pine County Association, of which Harold Roth his tester, showed an increase of \$1.68 per cow per month when drinking cups were installed in their barn. Sixteen barns of this association have cups. All owners say they have paid for themselves in two to four months. "Drinking cups show more returns per dollar expended than any other equipment money can buy," says Mr. Roth, as a result of his observations.

4-8 Lbs. Daily for Cups.

Two members of the Lyon County Association No. 1 installed drinking cups during January, according to Art Larson, tester. One member's cows increased from four to eight pounds of milk daily due to the drinking cups, and the other thinks the cups will pay for themselves in three to four month.

Drinking Cups Pay for Selves.

My observations as tester of the Nelson Cow Testing Association have convinced me of the fact that drinking cups for the cows are among the main articles of equipment for any dairy farm.

I have also observed that the cows do better in well lighted buildings and with swinging stanchions. Cement floors and gutters, litter carriers and good ventilating systems should also be considered very essential features of equipping the dairy farm.—Marion Johnson (Tester), Nelson Testing Assn., Douglas Co., Minn.

Cups Add 4 Pounds.

One member of the Brandon Association increased his herd average four pounds of butterfat per cow by putting in drinking cups and feeding a balanced ration. Several members have run short of alfalfa and clover hay and are feeding some more bran and oilmeal to make up for a shortage of protein in the ration.—Selmer Sunderland (Tester). —Items from Farm, Stock & Home and Northwest Farmstead.

FROM GOVERNMENT AND STATE BULLETINS

“Man and beast may live three weeks without food, three days without water and three minutes without air.”

A proper system of ventilation in a building permits the entrance of an abundance of fresh air charged with oxygen and removes the foul air. This foul air contains carbon dioxide, which is harmful to life, and also moisture, both of which are in the exhaled air. Moreover, on the average winter day, the building properly ventilated will actually show a more uniform temperature than the same building unventilated.

Proper ventilation of farm buildings is always necessary for profitable stock-growing and cattle-feeding. Dark, unventilated quarters for sheltering stock are damp, unsanitary and unhealthy. When housed in dark, unventilated buildings, animal vitality is lowered, growth is stunted and disease is encouraged.

Moderns construction shuts out the pure, fresh air that formerly leaked through the loose-fitted siding and ill-hung doors which were in use a generation ago. In like manner, the foul air is shut in and confined in the animals' quarters unless some provision is made to draw off this foul air and replace it with fresh air. Indeed, some very fine modern barns are damp, musty, foul-smelling stables with wet floors and beds, just because no thought was given to ventilation. This condition encourages the occurrence of pneumonia and pleurisy, calf and pig scours, and similar diseases, and it is

well-nigh impossible to control tuberculosis in a cattle herd if the animals are stabled in a poorly ventilated barn. The now very popular accredited herd work, aiming to eradicate tuberculosis, recognizes adequate building ventilation as being very important to the success of this work.

Too many stockmen have failed to give the subject of ventilation thoughtful consideration, with the result that their buildings have become centers of disease and the death losses are high in the herd. Fresh air is free and absolutely essential to the health and maximum efficiency of every living thing. Why deny it to animals that must be healthy to be profitable?

Careful tests show that the average 900-pound cow gives off daily 1.9 gallons of water as invisible vapor from the skin and lungs. A 20-cow stable would, therefore, have 38 gallons of water deposited in the air daily, approximately $1\frac{1}{4}$ barrels. This would go a long ways to explain the wet floors and bedding in poorly ventilated stables.—Extension Service Bulletin No. 106, Iowa State College of Agriculture and Mechanic Arts.

Dairy Barn Construction.

In a cow stable there are certain features, such as light, floor space, ventilation, air space, stalls, mangers, and gutters, which are generally recognized as essential.

Sunlight is considered essential to the health of the dairy cow, and it also tends to destroy disease germs which may be found in dark and dirty stables. It is necessary, therefore, that ample window space be provided. Four square feet of glass per cow is desirable, and a much larger amount is preferable, except in extremely cold climates.

Cow Stalls—The size and arrangement of cow stalls have become nearly standardized in general practice, except in respect to a few details. Manufacturers of cow-stable equipment have adjustable devices which permit moving the stanchion supports either forward or backward to accommodate various sizes of cows. The reason for varying the length of the platform or using these aligning devices is to keep the cows lined at the gutter when standing,

so that the manure will fall in the gutter and not on the platform where they have to lie down.

Stanchions—Comfort for the cow is important. The old-fashioned rigid wooden stanchion in which the cow was pilloried a portion of each day for a considerable part of the year has been replaced by the swinging stanchion, which gives the cow more freedom and allows her to rest in a natural position. Such stanchions may be obtained in either steel or wood. The former is considered more sanitary, but has the disadvantage of being cold for the cow's neck unless the surrounding air is amply warm. A wooden lining to the steel stanchion may be used to overcome this objection.

Water Supply—An ample supply of good water is a necessity on the dairy farm, and is highly essential in the dairy barn. There are several methods of watering the cows. Some dairymen prefer to water their cows at a watering trough outside, even in winter, employing heaters to bring the water to the proper temperature before permitting the cows to drink. Others advocate individual drinking cups attached to the stalls in order that the cows may drink whenever they like. Each system has certain merits, but the really important point is to see that plenty of water is provided both for watering the stock and for flushing the floors.—Farmers' Bulletin No. 1342, U. S. Department of Agriculture.

Frequent Watering Adds 20% Milk (S. Dak).

Cows watered three times a day drank almost 40 per cent more water than those watered less frequently and in restricted amounts and produced about 20 per cent more milk as a result. — Bulletin No. 175, Extension Service, South Dakota State College of Agriculture.

The Stable and Clean Milk Production.

Have the cow stable clean, well lighted, and well ventilated. A swing stanchion is usually preferred, as it allows the cow plenty of freedom. A low smooth manger without sharp angles is easy to keep clean.

Every cow stable should have a system of ventilation to keep the air fresh and pure and the cows comfortable without exposing them to injurious drafts. If the odor in the stable is disagreeable at any time, it indicates that the ventilation is deficient. At least 500 cubic feet of air space should be provided for each cow. Farmers who desire to provide proper ventilation in cow stables can obtain information on this point by applying to the Dairy Division of the United States Department of Agriculture.—Farmers' Bulletin, No. 602, U. S. Department of Agriculture.

Building the Dairy Barn.

The best barn is one that saves labor and keeps the stock comfortable, well and clean.

Wisconsin's reputation for good dairy cattle brings many buyers for such stock from outside the state. These buyers, in selecting healthy cattle, place much stress upon the kind and condition of building in which the stock was raised. A well planned barn adds more value than its cost to the market price of the farm, and reflects added value to the stock. The best barn is not always the most expensive one. A good plan and the selection of materials on the basis of local conditions save money.

It may be that the old barn can be remodeled with economy and satisfaction. Save as much of the old barn as possible. Let increased efficiency and availability of materials be the basis of all changes.—Bulletin No. 369, University of Wisconsin Agricultural Experiment Station.

The Purpose of a Ventilation System.

A good ventilation system, if properly installed and operated, will (1) supply without draft the abundance of fresh air necessary to the health and comfort of cows; (2) makes possible control of barn temperature; (3) preserve the building and feed stuffs from mold and rot due to excessive moisture and make spontaneous combustion less likely; (4) provide a measure of disease prevention and control.—Farmers' Bulletin No. 1393, U. S. Department of Agriculture.

TREASURER'S REPORT FOR YEAR ENDING JULY 1, 1925.

Receipts.

July 1, 1924, Balance on Hand-----	\$ 123.92
Oct. 9, 1924, Received from Geo. Caven-----	12.00
Feb. 19, 1925, Received from Geo. Caven-----	106.00
Apr. 13, 1925, Received from Geo. Caven-----	200.07
Total Receipts -----	\$ 441.99

Disbursements.

	Voucher No.	Amt.
Sept. 6, 1924, Chicago Produce Co. -----	594	\$ 1.95
Dec. 8, 1924, F. B. Morrison, expense Danville Convention -----	595	31.47
Dec. 8, 1924, N. F. O'Hair, work at Danville Convention -----	596	25.00
Jan. 19, 1925, Ley-Cross Printing Co., Programs and Membership Blanks -----	597	28.24
Feb. 13, 1925, William G. Morstrom, Silver Tro- phy-Cattle Judging-Carbondale -----	598	11.05
Mar. 5, 1925, Chicago Produce Co., telegrams and telephone -----	599	2.26
Mar. 30, 1925, Hugh Curtis Given, mailing re- ports -----	600	20.00
May 6, 1925, Chicago Produce Co., Mimeograph Letters -----	600	15.05
June 2, 1925, Hugh Curtis Given, postage and mailing reports -----	601	16.00
June 2, 1925, N. F. O'Hair, work and use of Auto-Carbondale -----	602	25.00
Total Disbursements -----		\$170.02
Total Cash Received for year to July 1, 1925---		\$441.99
Total Disbursements for year to July 1, 1925---		\$170.02
Balance on hand July 1, 1925-----		\$271.97

Respectfully submitted,

CHAS. FOSS,
Treasurer.

SECRETARY'S ANNUAL REPORT **For the Year Ending July 1, 1925**

Receipts

Life Memberships -----	\$	80.00
Five Year Memberships -----		5.00
Annual Memberships -----		414.00
Advertising -----		157.00
Banquet -----		95.00
	<hr/>	
	\$	751.00

Disbursements

Treas. Foss -----	\$	318.07
Traveling -----		24.90
Postage -----		30.43
Directors' Meetings (3) -----		27.60
Expense Carbondale -----		1.50
Banquet -----		103.00
Premiums -----		48.93
H. G. Van Pelt -----		100.00
Prize Calf Contest -----		39.50
	<hr/>	
	\$	693.93
Balance in Secretary's Hands -----	\$	57.07

GEO. CAVEN,
Secretary.

DIRECTORS' MEETINGS

Three meetings of directors were held during the year to plan work for the year, arrange for the annual convention and elect a treasurer and secretary.

At the meeting September 24 in Chicago, Chas. Foss was re-elected treasurer and Geo. Caven was re-elected secretary.

NEXT ANNUAL CONVENTION

The next Annual Convention will be held at Galesburg January 26, 27 and 28, 1926.

PRIZE WINNERS IN DAIRY CATTLE JUDGING AT CARBONDALE JANUARY, 1925

The Carbondale convention was a success in all its features and especially in the dairy cattle judging that occupied all of the first of the three convention days. Seventy-seven boys, 21 years and under, and several girls, entered the contest. The winners were:

First—Alfred Rogers, Mt. Vernon.

Second—Henry Phillips, Sesser.

Third—Claude Newton, Goreville.

Fourth—Glen Kirkpatrick, Sesser.

Fifth—A. L. Helms, Belleville.

Sixth—Carol Romack, Newton.

Seventh—Andrew Marlow, Mt. Vernon.

Eighth—Henry Sims, Albion.

Ninth—Vernon Harris, Albion.

Tenth—Edward Bunting, Albion, and Phillip Hardin, tied.

The winning team, given the Association silver cup, was won by the Sesser entry, consisting of Henry Phillips, Russel Ramsey, and Glen Kirkpatrick. Score, 470. The second highest had a score of 402 and was made up by Carl Fritschle, Carol Romack and Arthur Romack of Newton.

MEMBERSHIP LIST

July, 1924—July 1, 1925

A

- ALEXANDER, OTIS, Marion.
AVERY, C. S., Marion, R. 5.
ALDRIDGE, THOS. H., Villa Ridge.
ALDRIDGE, JOHN P., Cobden,
R. 3.
ALSTAT, JOS., DeSota.
ALLEN, H. E., Murphysboro.
ALLEN, L. R., Murphysboro.
ANDERSON, C. F., Mt Vernon,
R. 6.
ATKINSON, FRED, Chicago (Be-
atrice Creamery Co.)
ADKINS, B. T., Newton, Ill.

B

- BEATTY, W. S., Ewing.
BEASLEY, N. W., DeSota.
BERNHARD, LEO K., Anna.
BURREN, MRS. MANTHUS, Car-
bondale, R. 3.
BENZ, ALEX, Murphysboro.
BRANDON, RALPH, Murphysboro.
BENZ, HENRY, Murphysboro.
BURGESS, S. J., Mound City.
BAKER, L. H., Creal Springs, R. 3
BEARDEN, H. R., Marion.
BAYSINGER, LEE, Marion.
BONER, RALPH, Marion.
BROEKING, A. H., Marion, R. 2.
BUCHER, CARL, Cario.
BARTER, JAMES, Carrier Mills,
R. 1.
BLUE VALLEY CREAMERY CO.,
Chicago.
BASLER, JACOB, Cobden.
BARTSCH, LEE C., Cobden.
BASLER, LOUIS, Cobden.
BENER, SHERMAN, West Frank-
fort.
BIGHAM, GILBERT, Pinckney-
ville.
BECK, W. G., Pinckneyville.
BEARDEN, H. R.

C

- CAVEN, GEO., 136 W. Lake St.,
Chicago,
CAPLINGER, L. O., Marion.
CALDWELL, R. E., Waukegan.
CLUTTS, OLEY H., Cobden.
COCHRAN, P. A., Elkhville, R. 1.
CASLETON, E. M., Elkhville.
CHILDERS, GEO. W., Carterville.
R. 3.
CRAWSHAW, ABE, Murphysboro.
CHARTRAND AMADY, Murphys-
boro, R. 6.
COOK, J. J., St. Louis, 1448
Academy St.
CLAYTON, R., West Frankfort.
CLAYTON, VIRGIL, West Frank-
fort.
CALDWELL, LLOYD, Mt. Vernon.
CARRELTON, F. N., International
Harvester Co., Chicago.

D

- DAHMER, H. J., Marion, R. 2.
DORRIS, W. B., Johnson City, R. 1.
DOTY, R. M., Benton.
DIETZ, FRED, DeSota.
DILLINGER, J. A., Murphysboro.
DE LAVAL SEPARATOR CO.,
Chicago.
DORSEY, L. S., Moro.
DELAT, J. O., Norris City.
DE WERFF, H. A., Benton.

E

- EDDLEMAN, WESLEY G., Anna.
 EVETTS, J. W., Stonefort, R. 2.
 EVETTS, G. S., Creal Springs, R. 1.
 ENGLER, CARL, Cario.
 ELLIOTT, W. L., Marion, R. 4.
 EDMONDS, JOHN, DeSota, R. 2.
 ETHERTON, LEWIS, Murphysboro, R. 4.
 EVANS, J. A., Murphysboro, R. 7.
 ETHERTON, JAMES M., Murphysboro.
 EASTERLY, FRANK, Murphysboro.
 ETHERTON, J. E., Murphysboro.
 ETHERTON, JOSEPH D., Murphysboro.
 EDMONDS, JOHN, DeSota, R. 2.
 EDDLEMAN, CHAS., Anna.
 ELLIOTT, W. L., Marion, R. 4.

F

- FRY, J. P., Marion, R. 3.
 FEURER, E. E., Marion, R. 2.
 FRY, E. A., Marion, R. 2.
 FLAMM, LEONARD L., Cobden.
 FARLEY, J. E., Murphysboro, R. 1.
 FLATT, B. P., Benton.
 FILSOM, C. M., Salem, Dairy Agent C. and E. I. Ry.
 FIX, E. J., Benton.
 FARRELL, DUANE, Pomona.
 FOSS, CHAS., Freeport, R. 6.
 FRASER, PROF. W. J., Urbana, University of Illinois.

G

- GOING, HERMAN, Marion, R. 4.
 GOLEY, LEE, Marion, R. 3.
 GOODALL, JOAB, Marion.
 GRAEFF, S. G., Elkhville, R. 1.
 GUTHRIE, RUBEN J., Cobden.
 GUTHRIE, RAY L., Cobden.
 GRIFFITH, RALPH W., Cobden.
 GRAVES, F. L., Villa Ridge.
 GURLEY, C. P., Johnson City, R. 2.
 GRAEFF, H., Murphysboro, R. 6.
 GLENN, ARTHUR, Murphysboro.
 GRAVES, WILLARD H., Murphysboro.
 GREER, J. F., Carterville.
 GRIMES, JOHN, Carterville.
 GLENN, IKE, Murphysboro.
 GRAEFF, CLAUDE R., Murphysboro.
 GARNIER, F. C., Chicago. International Harvester Co.

H

- HAXS, NICK, Murphysboro, R. 5.
 HERRING, JOHN, Murphysboro, R. 6., Box 16.
 HAGLER, JAMES A., Murphysboro.
 HUBBS, J. F., Murphysboro.
 HAGLER, HARRISON, Murphysboro.
 HINES, BOSTA, Murphysboro.
 HINCHCLIFF, A. E., Pomona.
 HAMPTON, S. A., Marion.
 HARRIS, EZRA, Galatia, Galine Co.
 HART, W. H., Harrisburg, R. 1.
 HARTMAN, M. M., Mounds.
 HURDMAN, GEO. W., Anna.
 HATCHER, JAMES M., Harrisburg, R. 1.
 HIGHLAND, MARCUS, Cobden.
 HILTON, JOS. W., Cobden.
 HAMPTON, S. A., Marion.
 HAMILTON, GLENN, Ewing.
 HARPER, DOW, Marion.
 HATCHER, JAMES, Harrisburg, R. 1.
 HAMMOCK, W. M., Pinckneyville.
 HEWETT, W. L., Mattoon, 1720 Richmond St.
 HANNA, JAMES, Murphysboro.
 HIGHTOWER, W. M., St. Louis, Mo.

HETHERINGTON, S. L., Mt. Vernon.
 HORNEMAN, H. C., Danville,
 Sugar Creek Creamery Co.
 HALL, H. C.

HUTCHINSON, D. B., Decatur,
 325 West Hoy.
 HEPBURN, N. W., Peoria, Peoria
 Creamery Co.

I

IRISH, H. P., Farina.

J

JOHNSON, AMOS, Anna.
 JACKSON, SAM, America.
 JONES, D. B., Carterville.
 JAMES, F. R., Carterville.
 JAMES IRVIN, Carbondale.
 JORGENSEN, FRED, Champaign-
 Pioneer Creamery Co.
 JURY, E. L., Princeton.

JAMES, S. E., 166 Jackson Blvd.
 Chicago,
 JOLLIN, DAN, West Frankfort,
 R. 1.
 JACQUOT, PROSPER, DeSota.
 JACQUOT, EMILE, DeSota.
 JONES, L. F., Olive Branch.

K

KESSLER, WM. F., Cario, R. 1.
 KIMMELL, W. H., Creal Springs,
 R. 3.
 KIMMELL, P. W., DeSota.
 KIMMELL, OLIVER, DeSota.
 KRUMREY, JACOB, Marion, R. 3.
 KAESER, LOUIS, Marion, R. 3.
 KOENIG, AUGUST, Murphysboro,
 R. 1.
 KRUMREY, J. H., Marion, R. 2.
 KNOBELOCH, GEO., Marion, R. 3.

KAESER, LOUIS, Marion, R. 3.
 KIMMEL, WAT G., Anna.
 KOPP, G. A., Elkville.
 KIMMEL, E. E., Elkville.
 KLUGHART, WM., Cobden.
 KOENIG, AUGUST, Murphysboro,
 R. 1.
 KRAUPP, O. E., Pinckneyville.
 KRIEG, GEO. M., Stewardson.
 KENNARD, J. L., Evansville, Ind.

L

LAMER, R. EWING, Cobden.
 LEWIS, P. N., Marion, R. 3.
 LEIDIGH, D. H., Villa Ridge.
 LOY, J. H., Effingham.
 LEWIS, L. E., Sesser.
 LISENBY, J. N., Tamaroa.
 LALLY, W. A., 166 Jackson Blvd.,
 Chicago.

LENON, H. M., Clifford.
 LOGAN, C. C., Carbondale.
 LISENBY, W. R., Tamaroa.
 LEVAN, JOHN, Murphysboro,
 R. 7.
 LEVAN, JAMES, Murphysboro,
 R. 7.

M

MACKEY, D. W. P., Carbondale.
 MARSHALL, JOHN S., Murphys-
 boro, R. 1.
 McBRIDE, BURTON, Murphys-
 boro, R. 7.
 MILEUR, EDMOND, Murphys-
 boro, R. 5.

McCONNAUGHEY, D. P., Du-
 Quoin.
 MILES, LESLIE L., Lawrenceville.
 MOHAN, DAVID, Cambria.
 MEES, JOHN J., Anna.
 MEDLIN, ANDREW J., Anna.

MASON, J. P., Elgin.
MUCKLEROY, PROF. R. E., Car-
bondale.
MIDYELT, J. R., Ewing.
MEES, DAVID, Anna.
MOHAR, DAVID, Cambria.

MINER, COL. C. C., Woodstock.
McINTIRE, L. L., Mt. Vernon,
409 Casey Ave.
MARLEY, D. G., 608 S. Dearborn,
Chicago.

N

NAUSLEY, THOMAS, Murphys-
boro, R. 1.
NOLES, C. T., Pana.

NICHOLLS, JAMES, Vergennes,
R. 2.

O

O'DONNELL, GEO., Vincennes,
Ind., Tip-Top Creamery.

O'HAIR, W. S., Paris.
OVERSTREET, R. C., Marion.

P

PAGELS, H. C., Carterville, R. 2.
PAGUARD, EMILE, Murphysboro,
R. 5.
PHIFER, W. E., Murphysboro,
R. 5.
PULCHER, LOUIS, Murphysboro,
R. 7.
POPE, W. H., Marion.
PAPE, WM. F., Marion.

PROVINCE, J. A., Martenville,
R. 3.
PHILLIPS, FRED, Ewing.
PETRY, E. J., DuQuoin.
PHILLIPS, J. R., Sesser.
PARISH, W. A., Murphysboro.
PAYNE, JESSIE, West Frankfort.
PHILLIPS, J. H., Benton.
PLAUT, M. S., Clinton.

R

REDD, T. J., DeSota.
RUSSELL, M. S., Carterville, R. 3.
ROBINSON, MARION, Murphys-
boro.
ROBINSON, WILEY G., Murphys-
boro.
RENDLEMAN, C. M., Jonesboro.
RUHE, FRED, Marion, R. 3.
REDD, T. J., Carbondale.
RUSHING, S. A., DuQuon.
ROBERTS, EMMETT H., Mur-
physboro, R. 4.

ROBINSON, U. E., Elkville.
RIEGEL, W. W., Galatia, Galine
Co.
RENDLEMAN, CLIFFORD L.,
Cobden.
RAINS, W. C., West Frankfort.
RICHARDSON, PAUL, West
Frankfort.
ROBLEY, T. S., Enfield.
REVELLE, HARRY, Ziegler.
PHILLIPS, GEO., Sesser.
RICHERT, L. C., Pinckneyville.

S

SITTER, ROY, Cobden.
SITTER, JOS., Cobden.
SANDER, L. C., Marion, R. 3.
SINKS, W. D., Marion, R. 1.
SMITH BROTHERS, Murphysboro,
R. 3.
SANDERS, FRED, Harrisburg,

SANDERS, WILBURN, Harris-
burg, R. 3.
SMALL, JOHN C., Galatia.
SMALL, MRS. J. C., Galatia.
STAHLNUT, W. G., Marion, R. 3.
SPITZNASS, A. M., Marion, R. 2.
STOUT, HARRY P., Cobden.

SANDERS, W. T., Harrisburg.
 SINKS, W. D., Marion, R. 1.
 SMITH, L. L., Mounds.
 SCHOEMBS, E. O., Villa Ridge.
 SPITGNASS, A. M., Marion, R. 2.
 SMALL, EDITH E., Galatia, R. 1.
 STOKES, FRANK, Goreville.
 SMITH, DAN, Benton.

SCHWARTZKOFF, L., St. Louis, Mo.
 SMITH, T. P., Danville, Sugar Creek Creamery Co.
 STANARD, S. J., Springfield, Director of Agriculture.
 SIGLER, NOBLE, Carbondale.
 SIMS, W. M., Buckner.

T

THIS, FRANK M., Murphysboro, R. 5.
 TURNER, J. T., Murphysboro.
 TUTTLE, ROBT., Murphysboro.
 TERRY, CLAUDE A., Murphysboro.

TRIPP, E. M., Jonesboro.
 THULKELD, R. E., Ewing.
 TUCKER, G. E., Villa Ridge.
 TURNER, O. M., Pittsburgh, R. 1.
 THOMAS, C. J., Carbondale.

V

VAN PELT, H. G., Waterloo, Ia.

VEATCH, EVERTT, Norris City.

W

WHIPKEY, FRANK, DeSota.
 WAGLEY, JOHN, Carterville, R. 3.
 WALDRON, RICHARD, Carterville.
 WALLER, D. C., Murphysboro.
 WALLER, FRANK, Murphysboro.
 WILL, SAMUEL G., Murphysboro, R. 5.
 WHITCHUNH, J. E., Harrisburg.

WHITLOCK, J. L., Harrisburg, R. 5.
 WHITE, HARRISON, Marion.
 WALTON, E. B., Anna.
 WHITE, THURMOND, Marion.
 WOOD, WM. H., Cairo, R. 1.
 WICKER, D. F., Miller City.
 WHIPLSY, FRANK, Carbondale.
 WILBUR, E. D., Waukegan.

Y

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 YOUNG, CHAS. H., DeSota.

Z

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